The Horizon of Investors' Information and Corporate Investment

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ABSTRACT

We study the role of the horizon of investors' forecasts on corporate investment. In our theory, managers care about the short-run impact of their decisions on their stock price, which leads to underinvestment. However, managers underinvest less when investors' forecasts are more informative at the horizon corresponding to the horizon of their investment opportunities. We test these predictions using new data on investment horizon hand-collected from firms' regulatory filings. As predicted, more informative long-term (short-term) forecasts lead firms with long(short)-term projects to invest more, and even more so when managers have stronger incentives to maximize their current stock price.

Key words: Investment Horizon, Short-termism, Information Quality, Forecasting horizon, Forecasts' informativeness

JEL classification: D84, G14, G17, M41

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I Introduction

Recent research suggests that market participants have become better at predicting the short-term future and worst at predicting the long-term. Dessaint, Foucault, and Fresard (2021) shows that short-term earnings forecasts by US analysts have become more informative since the early 1980's, but long-term forecasts have become less so. In his presidential address, Graham (2022) provides consistent survey evidence for managerial forecasts. Over time, the horizon at which managers believe they can make reliable forecasts has declined.

This aggregate shortening of the horizon at which market participants can forecast the future could stem from a variety of factors.[1] In this paper, our objective is *not* to explain why this pattern is observed in the data. Instead, we focus on its possible implications.

We ask whether a shift in information available to investors at different horizons could affect real capital allocation across projects with different maturities. Addressing this question is important given the current concern for climate change, and the growing need for investment in projects that will only pay-off in the long-run. Our main hypothesis is that more information available about short-term outcomes can lead to more investment on projects with short maturity at the expense of long-horizon projects (and vice versa).

The intuition is as follows. If more short-term information is available, stock prices will better reflect the value of short-horizon projects (as investors trade on that information) and thus increase managerial incentives to invest in these projects. Bond, Edmans, and Goldstein (2012) refers to this real effect of financial markets as the "improved incentives" channel. The mechanism supporting our hypothesis here is the same, with one important and so far neglected caveat: for this channel to operate, the horizon at which more information becomes available must match the horizon of the investment project. If not, more information may lead to less, rather than more, investment in projects of a given maturity. Thus, the horizon at which financial markets produce information matters. Our main contribution is to provide both theoretical and empirical support for this theory.

To formalize the above intuition and guide our empirical analysis, we first consider a

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[1] Dessaint, Foucault, and Fresard (2021) highlight the role the short-term oriented nature of newly available sources of information.

model in which a firm's manager chooses how much to invest in a project that pays off either quickly (in the short-term) or slowly (in the long-term). In the baseline version, investment maturity is fixed, and the manager chooses the investment that maximizes a weighted average of the firm's current stock price and the firm long run fundamental value. After the manager undertakes the investment, investors receive two signals: (i) a *short-term signal* about the project cash-flow if it pays off quickly, and (ii) a *long-term signal* about the project cash-flow if it pays off slowly. As investors trade on these signals, the stock price of the firm reflects investors' information about the present value of the project's future cash-flows.

In equilibrium the manager underinvests relative to the efficient investment level. The reason is that the expected stock price does not fully reflect the impact of the investment on the firm value because investors' signals are imperfect (or not fully revealed in prices due to noise trading). An improvement in the informativeness of investors' signals then reduces this underinvestment problem.[2] However, and specific to our theory, this effect occurs only when the improvement in investors' signals matches the firm's investment horizon. As a result, the sensitivity of a firm investment to the informativeness of the long-term signal increases with the horizon of its investment while the sensitivity of a firm investment to the informativeness of the short-term signal decreases with horizon. This is our main prediction.

The model generates four additional ancillary predictions. First, the above mechanism relies on the premise that managers care about the value of their current stock price, and that firm investment is not immediately observable to investors. Therefore, the above effects should be stronger when managers have greater incentives to maximize their current stock price (Ancillary prediction #1), and weaker when investment is more easily observed (Ancillary prediction #2). Second, because of discounting, the main effects should also be weaker when the cost of capital is higher (Ancillary prediction #3). Finally, when we relax the assumption of fixed investment maturity and allow the manager to control the average maturity of the firm's investments by allocating more or less capital to the long-term project, then the model predicts that more capital is allocated (within firm) to the long-term project

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[2] Thus, trading in secondary markets has real effects. However, the feedback from the stock market to investment is not due to the fact that the manager learns new information from stock prices (see Bond, Edmans, and Goldstein (2012)). Rather it stems from the fact that the manager cares about the extent to which the stock price of her firm reflects the actual present value of the investment.

when the informativeness of the long-term signal increases or that of the short-term signal decreases (Ancillary prediction #4).

Testing the above predictions is challenging because the maturity of firms' investment opportunities is unobserved. To overcome this first challenge, we exploit the fact that the maturity of firms' projects varies by economic activity due to heterogeneity in (i) the length of the production and operation cycles, and (ii) the useful life of the assets employed. For instance, projects of firms in the ship building industry have intrinsically longer horizons than projects in the apparel industry. Thus, our theory implies that investment in the former industry should be more (less) sensitive to variations in the informativeness of investors' long-term (short-term) signals than investment in the latter.

To measure the average project horizon by industry, we average the horizon of the business plan that managers use for their firm in every industry. We obtain this information from regulatory filings. In these filings, managers may indeed refer to their "3-year business plan" or "5-year strategic plan". We thus search for all occurrences of regular expressions such as "-year business plan" or "-year strategic plan" through the content of all SEC filings and then hand-collect the information about the business plan horizon. We were able to uncover information about this horizon for 3,925 firms from 13,908 filings. We then average this horizon across all firms and years by SIC2-industry and obtain a (time-invariant) measure of investment horizon by industry. The average horizon across all industries is 4.45 years, and ranges between 1 and 8 years. Firms in the utility, mining, steel, and shipbuilding industries display the longest project horizons.

Another empirical challenge is to measure and identify variation in the informativeness of investors' signals about short and long-term cash flows that is unrelated to other determinants of investment. To address this challenge, we focus on sell-side analysts' forecasts and use the measure of forecasts informativeness (denoted R^2) developed by Dessaint, Foucault, and Fresard (2021) (hereafter DFF2021).[3] For a given analyst-date-horizon, this R^2 measure is obtained by regressing realized earnings at a given horizon (e.g., in 3 years from now) on earnings forecasts at this horizon. A higher R^2 for this regression means that the

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[3] For evidence that investors rely on analysts' forecasts for valuing stocks, see Landier and Thesmar (2020) or Hong, Wang, and Yang (2021).

analyst's forecasts have a higher predictive power for the earnings of the firms she covers (e.g., if $R^2 = 1$, the analyst has perfect foresight). To mitigate (some) endogeneity concerns, we focus on variation in R^2 that are common to all analysts in the economy (instead of using firm-level variations). Aggregate variation in R^2 are indeed more likely to reflect countrywide economic forces that are plausibly exogenous to firm-specific determinants of investment. Thus, we average R^2 across all analysts by year and horizon to obtain two aggregate measures of the informativeness of investors' signals: one for short-term horizons (between 1 and 2 years), and another one for long-term horizons (beyond 2 years).

To test our main prediction, we estimate a standard investment equation augmented with interaction terms between firms' project horizon and the informativeness of investors' signals at short and long horizons. This specification allows us to measure separately the sensitivity of firm investment to the informativeness of the long and short-term signal, and how this sensitivity changes as projects' maturity increases. As predicted, the sensitivity to the long-term signal increases with project maturity *and* the sensitivity to the short-term signal decreases. Simply put, firms with long(short)-maturity projects invest relatively more when the informativeness of investors' long-term (short-term) signals improves. Hence, the horizon at which financial markets produce information matters. These results hold after controlling for other determinants of investment documented in the literature, especially the value of new investment opportunities (through Tobin's Q corrected for measurement error following Erickson, Jiang, and Whited (2014)).

Next, we test all ancillary predictions. We start with Ancillary prediction #1 predicting that the above effects should vary with managerial incentives. This requires identifying when managers may be more concerned about the value of their current stock price. Existing literature suggests this occurs in the following four situations: when managers' compensation and wealth are more directly tied to the current stock price, when shareholders' horizon is short, when equity dependence is strong, and when takeover threat is high. In all four situations, our baseline effects are significantly stronger (as our theory predicts). Moreover, we also find greater effects when using the number of words referring to short rather than long-term horizons in regulatory filings as a direct measure for the weight assigned by the manager to maximizing the current stock price in her objective function.

To test Ancillary prediction #2 according which the main effects should also vary with investment observability, we focus on firms (i) quickly reporting their financial statements, (ii) making guidance on capex, and (iii) disclosing information about their investment plan. For these firms, our main result tends to disappear. As predicted, weaker effect is observed when information asymmetry is low (either because this asymmetry is quickly resolved after the end of fiscal quarter, or because firms disclose more information about their capex).

To test Ancillary prediction #3, we use various estimates for the firm weighted average cost of capital and find weaker effects when future cash flows are more heavily discounted.

To test Ancillary prediction #4, we focus on multi-division firms operating in multiple SIC2 industries. These firms can alter the average maturity of their investment by shifting resources across industries with different investing horizon. As predicted, we find that they allocate more capital to divisions operating in industries with long maturity projects when the informativeness of investors' long-term signals improves or when that of short-term signals deteriorates. This last test allows us to include firm-year fixed effects in our specification and thus to control for any confounding time-*varying* determinant of firm investment.

Overall, both the main prediction of the model and the ancillary predictions are well supported by the data. The ancillary results are important. They show that greater investment sensitivity to the informativeness of the long-term (short-term) signal as maturity increases (decreases) is indeed due to the "improved incentives" channel. Any alternative channel must explain not only our main finding but also all of the ancillary results.

Finally, we investigate whether the shift in capital allocation is beneficial to shareholder value. We do so focusing on large scale investments dedicated to the acquisition of private firms for which we observe the market reaction when the project is undertaken. We find that the market reaction to acquiring targets in long-horizon industries increases when long-term signals are more informative. Thus, more information about the long-run is associated with more valuable long-term investments. This evidence is consistent with under-investment in long-term projects induced by investors' imperfect information about the long-term future. Combined with the previous evidence, it suggests that investors' focus on producing short-term information can crowd out valuable investment in long-term projects.

The rest of the paper is organized as follows. In the next section, we position the contribution of our paper in the literature. In Section III, we present the theory that guides our empirical analysis. Section IV presents the data and our new measure of project horizon. In Sections V, we report our findings. Section VI discusses alternative explanations as well as the implications of our findings. Section VII concludes. All definitions for the variables used in our tests and the proofs of the theoretical claims are reported in the Appendix.

II Contribution to the Literature

Our paper is related to two strands of literature. First, it contributes to the literature on the real effects of trading in secondary markets (see Bond, Edmans, and Goldstein (2012) and Goldstein (2022) for surveys). This literature largely focuses on the learning channel, whereby the information produced by stock markets affects real decisions because managers learn information (about their investment opportunities) from stock prices. Our paper focuses on another channel, "the incentives channel" (see Bond, Edmans, and Goldstein (2012), Section 3) that has received less attention. According to this channel, the information produced in secondary markets matters because managers' compensation (or incumbent shareholders wealth) depends in part on their short-term stock price. If this price does not fully reflect the net present value of managers' investment decisions (because it takes time for investors to collect information about the cash-flows created by new investment opportunities), managers make investment decisions that do not maximize their firm long run value. Fishman and Hagherty (1989) develop a theory of corporate disclosure based on this channel. Our theory builds on their model accounting for the fact that firms differ in the maturity of their investment.[4] It highlights one implication of the incentives channel, namely investment inefficiencies (underinvestment in our model) should be smaller when investors produce information at the horizon relevant given the maturity of a firm's investment and

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[4] Dow, Han, and Sangiorgi (2021) consider a model in which firms choose the maturity of their investment. In their model, firms with projects that mature faster attract more informed traders because their future stock price reflects fundamentals more quickly, enabling informed investors to cash in and exit their positions (to recycle their capital) more quickly. In turn, firms with more informed traders can better incentivize managers using compensation schemes based on the current stock price. This leads firms to excessively reduce the maturity of their investment projects (relative to the social optimum). Our analysis focuses on the level of investment in a project, holding its maturity fixed.

our tests provide support for this implication.[5] We are not aware of papers relating changes in the informativeness of investors' signals at various horizons to investments in projects of different maturities. To do so, we propose a novel text-based approach to measure the horizon of firms' projects based on that of their business plans.[6]

The incentives channel assumes that managers care about the effect of their decisions on their short-run stock price. For this reason our paper is also related to the literature on the real effects of equity-based compensation. Several theories (e.g., Stein (1988), Stein (1989), Bebchuk and Stole (1993), Bizjak, Brickley, and Coles (1993), Goldman and Slezak (2006), Benmelech, Kandel, and Veronesi (2010), Edmans et al. (2012), and Marinovic and Varas (2019)) predict that equity-based pay can induce CEOs to take actions (e.g., cut investment) that increase their stock price in the short-run at the expense of their firm's long run value ("short-termism" or "managerial myopia").[7] Several recent papers (Asker, Farre-Mensa, and ljungqvist and (2016), Edmans, Fang, and Lewellen (2017), Ladika and Zautner (2020), Edmans, Fang, and Huang (2022)) provide empirical support for this possibility. In contrast, we focus on a different effect of equity-based compensation. Namely that it should induce variations in the amounts invested in projects of different maturity when the informativeness of investors' signals at different horizons varies. In this way, we contribute to the scarce literature on the sources of variations in the composition of investment (long-term versus short-term) in the economy (see Aghion, Angeletos, Banerjee, and Manova (2010)).

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[5] In Edmans (2009), the presence of a large blockholder mitigates underinvestment in long-term projects because a blockholder has incentive to produce information about these projects and is therefore less likely to sell her stake (and depresses the stock price) following bad news when long-term projects are sound. To the extent that the informativeness of investors' signals about firms' long-term cash-flows are higher in firms with large blockholders, our model would also imply a positive effect of block ownership on long-term investment.

[6] In contrast, the existing literature relies on the type of investment (R&D and patent applications are assumed to correspond to long-term investment) or the nature of firm's assets (e.g., Hubert de Fraisse (2022)). Instead, we measure the horizon of projects directly from textual mentions in firms' disclosures.

[7] A related literature explains why, despite this possibility, shareholders can find optimal to use equity-based compensation for CEOs, in the presence of agency issues (e.g., Bolton, Scheinkman, and Xiong (2006)). More broadly, several papers analyze how performance-based compensation (e.g., based on earnings) affect managers' choices between long-term and short-term projects (e.g., Narayanan (1985), Von Thadden (1995) or Thakor (2020).

III Theory

A Baseline model with fixed maturity

Figure I shows the time line of the model. At date 0, the manager of an all-equity firm must choose the scale I_m of an investment. The cost of the investment is $C(I_m)$ where $C(0) = 0$. This cost is increasing in investment and strictly convex with $\lim_{I_m \to \infty} C'(I_m) = \infty$. The investment is funded by the cash holdings M of the firm. The residual $(M - C(I_m))$ is distributed to current shareholders as a dividend at date 0. The manager's investment decision, I_m (and the firm's cash holdings) is correctly anticipated by investors in equilibrium but not directly observed when the stock price of the firm is determined at date 1.[8]

[Insert Figure I about here]

With probability $(1-h)$ the investment generates a (per share) cash-flow $\theta_{st}(I_m) = \kappa I_m + \eta_{st}$ at date 2 and zero at date 3. With probability h, the investment generates a cash-flow of zero at date 2 and a cash-flow of $\theta_{lt}(I_m) = I_m + \eta_{lt}$ at date 3 where $\eta_j \rightsquigarrow N(0, \sigma^2_{\eta_j})$ for $j \in \{st, lt\}$ and $Cov(\eta_{st}, \eta_{lt}) = 0$.[9] Thus, parameter $h \in [0, 1]$ controls the horizon of the investment. The higher is h, the higher is the expected maturity ("horizon") of the investment. We assume that h is observed (this is a characteristics of the firm). In contrast, the cash-flows are uncertain because the $\eta_j s'$ are unknown. Henceforth, we refer to $\theta_{st}(I_m)$ as the short-term cash-flow and to $\theta_{lt}(I_m)$ as the long-term cash-flow.

Given these assumptions, at date 0, the manager expects the firm's cash-flows (per share) at dates 2 and 3 to be respectively $(1 - h)\kappa I_m$ and hI_m. Parameter κ allows to control the relative profitability of short-term vs. long term investment. For instance, when κ decreases, short-term investments (those with low h) become relatively less attractive since their expected payoff decreases.

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[8] One reason is that there is a delay between the moment investment decisions are made in a year and reported to investors. Another possible reason is that investment plans take time to implement (see, Lamont (2000) and Christano and Todd (1996)) and structure investments are realized (and expensed) over multiple periods (see Luo (2022)).

[9] The assumption that the cash-flow of the investment is proportional to the investment is as in Fishman and Hagerty (1989) or Edmans (2009).

At date 1, as in Kyle (1985), one risk neutral informed investor and noise traders can trade shares of the firm stock with a risk neutral competitive market maker. The informed investor has two signals s_{st} (the "short-term signal") and s_{lt} ("the long-term signal") such that:

$$s_j = \theta_j(I_m) + (\tau_j)^{-1/2}\varepsilon_j, \text{ for } j \in \{st, lt\}. \tag{1}$$

where $\varepsilon_j \rightsquigarrow N(0, \sigma^2_{\eta_j})$. When τ_j increases, the precision of the signal of type j increases. Let $R^2_j \equiv \frac{\tau_j}{1+\tau_j}$. It is easily checked that R^2_j is the R-squared of a regression of the cash-flow $\theta_j(I_m)$ on the signal s_j. Thus, the higher is R^2_j, the higher is the predictive power of the signal at horizon j for the cash-flow at this horizon. For this reason, we refer to R^2_{st} (R^2_{lt}) as the informativeness of the informed investor's signal (or forecasts) about the short-term (long-term) cash-flow. We assume that the noise terms in the informed investor's signal are independent ($Cov(\epsilon_{st}, \epsilon_{lt}) = 0$).

We denote by $x(s_{st}, s_{lt})$ the market order submitted by the informed investor and by z the noise traders' aggregate demand. As in Kyle (1985), z is normally distributed with mean zero and variance σ^2_z. The risk neutral dealer observes the aggregate order flow $O = z + x(s_{lt}, s_{st})$ and sets the asset price so that she breaks even:

$$p_1(O; I_b, I_m, h) = \mathrm{E}(V(I_b, h)\,|O = z + x(s_{lt}, s_{st}))\,, \tag{2}$$

where

$$V(I_b, h) = \begin{cases} \dfrac{\theta_{st}(I_b)}{1+r} \text{ with prob. } (1-h), \\ \dfrac{\theta_{lt}(I_b)}{(1+r_h)^2} \text{ with prob. } h, \end{cases} \tag{3}$$

and r is the firm's cost of capital. That is, $V(I_b, h)$ is the discounted value of the firm's future cash-flows (its fundamental value) given that the market maker and the informed investor expect the manager to invest I_b. At date 1, the firm's fundamental value is unknown because (i) the date at which the investment generates its cash-flow is uncertain and (ii) this cash-flow is uncertain because the $\eta_j s'$ are unknown. However, the informed investor receives signals about the firm's cash-flow, whose mean values depends on the actual investment of the firm, I_m. This explains why ultimately the stock price at date 1 depends on the actual manager's investment decision at date 0, even though at date 1 this decision is not yet observed.

At date 0, the manager chooses the investment that maximizes a weighted average of the expected stock price at date 1 (the firm's short-term stock price) and the expected long run value of the firm plus the firm's cash holdings (M) net of the cost of investment. Specifically, the manager solves the following problem[10]:

$$I_m^* \in \text{Argmax}_{I_m} \quad \omega \text{E}(p_1^*(O; I_b, I_m, h)) + (1-\omega)\text{E}(V(I_m, h)) + M - C(I_m), \tag{4}$$

where $\omega \in [0, 1]$ (the sensitivity of the manager's objective to the short-term stock price) is a measure of the managerial myopia (short-termism). There might be several reasons why the manager cares about the impact of her investment decision on the firm's stock price in the short-run (see Stein (1989)). One possibility is that the manager acts on behalf of incumbent shareholders who plan to liquidate their stake in the short-run (at date 1). Alternatively, the manager's compensation can be tied to the stock price. For instance, Edmans, Fang, and Lewellen (2017) shows that the amount of vesting equity in a given quarter has a negative effect on the growth of investments in research and capital expenditures (see also Ladika and Zautner (2020)). In this case, $\omega \times \text{E}(p_1^*(O; I_b, I_m, h))$ can be interpreted as the amount of vesting equity in the next period for the manager.

In equilibrium, the informed investor and the market-maker' belief about the manager's investment decision is rational, that is, $I_b = I_m^*$. However, in solving for the equilibrium, one must entertain the possibility that $I_m \neq I_b$ because the manager's deviation from the equilibrium investment strategy is not observed at date 1. Note that for $I_b \neq I_m$, the expected stock price at date 1 differs from the manager's expectation about the long-run value of the firm because $\text{E}(p_1^*(O; I_b, I_m, h)) = \text{E}(V(I_b, h) \neq \text{E}(V(I_m, h)$.

Equilibrium definition. An equilibrium of the model is a vector $(I_m^*, I_b^*, x^*(s_{st}, s_{lt}), p_1^*)$ such that:

1. The firm's stock price at date 1 is such that the risk-neutral dealer breaks even:

$$p_1^*(O; I_b^*, I_m^*, h) = \text{E}(V(I_b^*, h) \,|O = z + x^*(s_{st}, s_{lt}))\,. \tag{5}$$

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[10] To simplify notations, we assume that the time elapsed between date 0 and 1 is short so that we can ignore discounting between dates 0 and 1 in specifying the manager's objective function.

2. The market order of the informed investor, $x^*(s_{lt}, s_{st})$, maximizes her expected profit:

$$x^*(s_{st}, s_{lt}) \in \text{Argmax}_x \ \text{E}((V(I_b^*, h) - p_1^*)x \,|s_{st}, s_{lt})\,. \tag{6}$$

3. The investment of the manager at date 0, I_m*, maximizes current shareholders' wealth at date 0:

$$I_m^* \in Argmax_{I_m} \quad \omega\text{E}(p_1^*(O; I_b^*, I_m, h)) + (1-\omega)\text{E}(V(I_m, h)) + M - C(I_m). \tag{7}$$

4. Market participants (the dealer and the informed investor) have rational expectations about the manager's investment decision: $I_b^* = I_m^*$.

To solve for the equilibrium, we first derive the equilibrium of the stock market date 1, for arbitrary values of I_b and I_m. Then in a second step we derive the optimal investment decision of the manager at date 0. We define $\Delta(h, r, \kappa) = (\frac{\kappa(1-h)}{1+r} + \frac{h}{(1+r)^2})$. This is the ex-ante (date 0) expected marginal present value of one dollar invested in the firm's project given its maturity, h.

Lemma 1 ***Equilibrium of the stock market.*** *For given values of (I_b, I_m), the equilibrium of the stock market at date 1 is such that:*

$$x^*(s_{st}, s_{lt}) = \beta_{st}(s_{st} - \kappa I_b) + \beta_{lt}(s_{st} - I_b) \tag{8}$$

$$p_1^*(O; I_b, I_m, h) = \Delta(h, r, \kappa)I_b + \lambda O, \tag{9}$$

where $\lambda = (\frac{(\frac{(1-h)}{1+r})^2 R_{st}^2 \sigma_{\eta_{st}}^2 + (\frac{h}{(1+r)^2})^2 R_{lt}^2 \sigma_{\eta_{lt}}^2}{4\sigma_z^2})^{\frac{1}{2}}$, $\beta_{st} = \frac{(1-h)}{(1+r)}\frac{R_{st}^2}{2\lambda}$, $\beta_{lt} = \frac{h}{(1+r)^2}\frac{R_{lt}^2}{2\lambda}$ *and* $O = x^*(s) + z$.

The equilibrium of the stock market is similar to that in Kyle (1985). The main difference is that the informed investor has two signals: (i) one useful to forecast the long-term cash-flow (θ_{lt}) and (ii) one useful to forecast the short-term cash-flow (θ_{st}) . As in Kyle (1985), the investor trades less aggressively on her signals when her trade has a stronger impact on the equilibrium price (β_j is inversely related to λ). Moreover, the investor trades more on a given signal if the informativeness of this signal increases (β_j increases with R_j^2). Last, the investor trades relatively more on the short-term signal and less on the long-term signal when h is lower. Thus, the order flow is more informative about the short-term cash-flow when the horizon of the investment decreases.

Importantly the sensitivity of the expected stock price at date 1 to the investment of the firm at date 0 increases with the informativeness of the investor's signal, R^2_{st} and R^2_{lt}. To see this, observe that the order flow at date 1 is:

$$O = x^*(s_{st}, s_{lt}) + z = \beta_{st}\kappa(I_m - I_b + \eta_{st} + (\tau_{st})^{-1}\varepsilon_{st}) + \beta_{lt}(I_m - I_b + \eta_{lt} + (\tau_{lt})^{-1}\varepsilon_{st}) + z, \quad (10)$$

because the informed investor's signals are about the actual firm's cash-flows (that is, the cash-flows under the actual investment of the firm, not the investment anticipated by the informed investor). Thus, the manager expects the stock price at date 1 to be[11]

$$\begin{aligned} \mathrm{E}(p^*_1(O; I_b, I_m, h)) &= \Delta(h, r, \kappa)I_b + \lambda E(O) \\ &= \Delta(h, r, \kappa)I_b + \lambda\beta_{st}\kappa(I_m - I_b) + \lambda\beta_{lt}(I_m - I_b) \qquad (11) \\ &= \Delta(h, r, \kappa)I_b + \gamma(R^2_{st}, R^2_{lt}, h)(I_m - I_b). \end{aligned}$$

where

$$\gamma(R^2_{st}, R^2_{lt}, h) = \frac{1}{2}(\frac{(1-h)\kappa}{(1+r)}R^2_{st} + \frac{h}{(1+r)^2}R^2_{lt}). \quad (12)$$

Thus, $\gamma(R^2_{st}, R^2_{lt}, h)$ is the sensitivity of the stock price to the firm investment on average. It increases with the informativeness of the informed investor's signals, R^2_{st} and R^2_{lt}. Intuitively, the stock price at date 1 reflects the effect of the firm's investment on the value of the firm only insofar that market participants (in this case the informed investor) have information about future cash-flows. Moreover, the investor trades more aggressively on her signals, and thus more information is impounded into prices about the effect of the investment on future cash-flows, when these signals are more informative. We deduce from eq.(7) (the manager's investment problem)o, the following result.

Proposition 1 *The optimal investment of the firm at date* 0, I^*_m, *solves:*

$$C'(I^*_m) = \omega\gamma(R^2_{st}, R^2_{lt}, h) + (1-\omega)\Delta(h, r, \kappa). \quad (13)$$

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[11] The manager's expectation differs from that of the informed investor or the market maker because the manager knows that her investment. For instance, the market maker and the investor expects the order flow to have a mean of zero given their conjecture that the manager invest I_b. However, this is not the case if the manager invests an amount different from I_b.

Thus, holding the horizon of investment (h) constant, the investment of the firm at date 0 *increases with the informativeness of the short-term signal* ($\frac{\partial I_m^*}{\partial R_{st}^2} > 0$) *and the informativeness of the long-term signal* ($\frac{\partial I_m^*}{\partial R_{lt}^2} > 0$)*. However, the sensitivity of investment to the informativeness of the short-term signal decreases with the horizon* ($\frac{\partial I_m^*}{\partial h \partial R_{st}^2} < 0$) *while the sensitivity of investment to the informativeness of the long-term signal increases with the horizon* ($\frac{\partial I_m^*}{\partial h \partial R_{lt}^2} > 0$)*.*

Holding the maturity of investment fixed (i.e., for a given h), an increase in the informativeness of the signals used by informed investors leads to an increase in investment of the firm.[12] However, the magnitude of the sensitivity of investment to the informativeness of the informed investor's signal at a given horizon depends on the horizon. That is, an increase in the informativeness of the short-term signal has a weaker effect on investment when the maturity of this investment is longer (h increases). In contrast, an increase in the informativeness of the long-term signal has a stronger effect on investment when its maturity is longer. This differential effect of the informativeness of short-term and long-term signals on the firm's investment is our main prediction and we test it in Section V.

To better highlight this point, henceforth we assume that $C(I_m^*) = \frac{1}{2}(I_m^*)^2$. In this case, eq.(13) implies:

$$I_m^* = \alpha_0 + \alpha_1 \times h + \alpha_2 R_{st}^2 + \alpha_3 (R_{st}^2 \times h) + \alpha_4 (R_{lt}^2 \times h), \tag{14}$$

with $\alpha_0 = \frac{(1-\omega)\kappa}{(1+r)}$, $\alpha_1 = \frac{(1-\omega)}{(1+r)^2}$, $\alpha_2 = \frac{\omega\kappa}{2(1+r)}$, $\alpha_3 = -\alpha_2$, and $\alpha_4 = \frac{\omega}{2(1+r)^2}$. This linear specification for the relationship between investment and signals' informativeness corresponds to the specification that we estimate in Section V. The main prediction is $\alpha_3 < 0$ and $\alpha_4 > 0$.

It is easily checked that an increase in the manager's myopia (ω) reduces investment ($\frac{\partial I_m^*}{\partial \omega} < 0$), as found empirically by Edmans, Fang, and Lewellen (2017). More importantly for our purpose, the joint effects of the investment horizon and signals informativeness become stronger (in absolute value) when the manager's myopia increases ($\mid \frac{\partial \alpha_3}{\partial \omega} \mid > 0$ and $\mid \frac{\partial \alpha_4}{\partial \omega} \mid > 0$).

Eq.(14) also implies that investment should decrease with the level of the firm's cost of

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[12] Derrien and Kecskes (2013) finds that firms losing analysts coverage reduce their investment. To the extent that a drop in analyst coverage reduces the informativeness of signals available to investors to forecast short-run and long-run cash-flows, their result is consistent with this implication of the model. Their interpretation is different, however (they argue that a loss in analysts' coverage raises the firm cost of capital).

capital, r. This simply reflects the fact that expected net present value of the firm project is then smaller. More interestingly, the effect of short-term and long-term informativeness on the sensitivity of a firm investment to the horizon of this investment should be smaller (in absolute value) when the cost of capital is higher (($| \frac{\partial \alpha_3}{\partial r} |< 0$ and $| \frac{\partial \alpha_4}{\partial r} |< 0$.)). The reason is that the marginal increase in net present value due to reduced investment inefficiency is smaller when future cash-flows are more discounted.

The model also implies that the maturity of an investment, h, should affect the level of investment. Indeed, eq.(14) implies:

$$\frac{\partial I_m^*}{\partial h} = \alpha_1 + \alpha_3 R_{st}^2 + \alpha_4 R_{lt}^2. \tag{15}$$

We have $\alpha_3 < 0$, $\alpha_4 > 0$ and the sign of α_1 can be positive or negative depending on κ and r. Thus, the model does not make clear-cut predictions about the effect of the maturity of investment on the level of investment (this effect is positive for κ low enough and negative for κ large enough for instance). Our objective is not to study this effect but the effect of the informativeness of the signals available at date 1 on the sensitivity of investment to maturity (the interaction effects between h and R_h^2)).[13]

In equilibrium, $I_b^* = I_m^*$ (investors correctly anticipate the level of investment by managers). Thus, in equilibrium, the firm value at date 0 is (from eq.(7)):

$$V_0^*(h, R_{st}^2, R_{lt}^2) = \mathrm{E}(V(I_m^*, h)) = \Delta(h, r, \kappa) I_m^* + M - C(I_m^*). \tag{16}$$

The efficient investment level (the level maximizing the firm long-run fundamental value) is obtained when $\omega = 0$. Let I^e be the his efficient level. We obtain the following corollary.

Corollary 1 *In equilibrium, the manager underinvests:* $U^* = I^e - I_m^* > 0$ *when* $\omega > 0$. *The level of underinvestment decreases with the informativeness of the long-term and the short-term signals. However, the negative effect of the informativeness of the short-term signal on*

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[13] To simplify notations, we have assumed that the discount rate, r, is identical for short-term and long-term cash-flows. However, it is straightforward to extend the model to the case in which the long-run discount rate differs from the short term. In this case, all terms in $(1+r)^2$ (resp., $(1+r)$) must be replaced by $(1+r_{lt})^2$ (resp., $(1+r_{st})$) where r_{lt} (r_{st}) is the long (short) run discount rate. One can then show that the sensitivity of firms' investment to an increase in the long run interest rate is negative and even more so for firms with longer investment horizon (i.e., $\frac{\partial^2_{I_m^*}}{\partial r_{lt} \partial lt} < 0$), as documented by Hubert de Fraisse (2022).

underinvestment is weaker as the maturity of investment increases while the negative effect of the informativeness of the long-term signal on underinvestment is stronger as the maturity of investment increases ($\frac{\partial U^*}{\partial h \partial R^2_{st}} = -2\alpha_3 > 0$ *and* $\frac{\partial U^*}{\partial h \partial R^2_{st}} = -2\alpha_4 < 0$)*.*

The manager's short-termism induces underinvestment at date 0 because it takes time for the impact of the firm's investment on future expected cash-flows to be fully reflected into the stock price. In line with this implication, Asker, Farre-Mensa, and ljungqvist and (2016) find that public firms underinvest relative to private firms because of short-termism pressures. Our theory further predicts that an improvement in the informativeness of the signals received at date 1 by stock market participants should alleviate this issue. Intuitively, the manager has less incentive to forgo positive NPVs when the value of these investments is more quickly into stock prices when investors are better informed about future cash-flows. The last part of Corollary 1 shows that an improvement in investors' forecast informativeness has a stronger negative effect on underinvestment when forecasts are informative at the horizon of investments projects. This suggests that to reduce underinvestment in long-term projects, an informative stock market is useful but not sufficient. In addition, it must be informative about long-horizon cash-flows.

Testing whether short-termism induces underinvestment is difficult because the efficient level of investment is not easy to measure empirically.[14] However, as shown in the proof of Corollary 1, the effects of signals' informativeness on underinvestment (U) are driven by the effects of signals' informativeness on I^*_m (because the efficient level of investment, I^e, does not depend on signals informativeness). Thus, testing whether $\alpha_3 < 0$ and $\alpha_4 > 0$ in eq.(14) is the same thing as testing the joint effect of signal informativeness and investment horizon on underinvestment (as the last part of Corollary 1 implies).

B Extension to multiple projects with different maturity

In the baseline model, the firm has a single project with a fixed maturity, h. In this section, we consider a different case. We consider a firm that can allocate a fixed capital, $\bar{I}$, between two projects: (i) A short-term project that pays a cash-flow $\theta_{st} = \kappa I_{st} + \eta_{st}$ at date 2 and

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[14] Asker, Farre-Mensa, and ljungqvist and (2016) addresses this issue by comparing the investment of private firms (insulated from stock market driven short-termism) to the investment of similar public firms.

(ii) A long-term project that pays a cash-flow $\theta_{lt} = I_{lt} + \eta_{lt}$ at date 3, where I_h is the investment in the project with maturity h and $\bar{I} = I_{st} + I_{lt}$. The total cost of investment is $C(I_{st}, I_{lt}) = 0.5I_{st}^2 + 0.5I_{lt}^2$. To simplify, we assume that $\bar{I}$ is fixed and known to investors but investors do not observe how the manager allocates capital between the two projects. In this version of the model, the firm implicity chooses the average duration of her investment by choosing I_{st} and I_{lt}. Given its allocation of capital, the fundamental value of the firm is:

$$V(I_{st}, I_{lt}) = \frac{\theta_{st}}{(1+r)} + \frac{\theta_{lt}}{(1+r)^2}, \tag{17}$$

and the manager now chooses I_{st} and I_{lt} at date 0 to maximize:

$$\{I_{st}^*, I_{lt}^*\} \in Argmax_{\{I_{st}, I_{lt}\}} \quad \omega \mathrm{E}(p_1^*(O; I_{b,st}, I_{b,lt}, I_{st}, I_{lt})) + (1-\omega)\mathrm{E}(V(I_{st}, I_{lt}) + M - C(I_{st}, I_{lt}), \tag{18}$$

under the constraint that $\bar{I} = I_{st} + I_{lt}$ and where $I_{b,h}$ is the market maker and the informed investors' belief about the manager's investment in the project with maturity h. The analysis of this case is very similar to that in the baseline case. Thus, we report the optimal firm's investment in the next proposition and provide the detailed analysis of this case (in particular the derivation of the equilibrium of the stock market) in the online appendix.

Proposition 2 *. Let* $I^e(\bar{I}) = \frac{\bar{I}}{2} + \frac{\kappa}{1+r} - \frac{1}{(1+r)^2}$*. At date 0, the manager optimally chooses the following allocation of capital between the two investment projects:*

$$I_{st}^*(\omega) = I^e(\bar{I}) + \frac{\omega}{2}\left[\frac{\kappa}{1+r}(\frac{R_{st}^2}{2} - 1) + \frac{1}{(1+r)^2}(1 - \frac{R_{lt}^2}{2})\right], \tag{19}$$

and

$$I_{lt}^*(\omega) = \bar{I} - I_{st}^*. \tag{20}$$

Thus, the investment in the long-term (resp., short-term) project increases in the informativeness of the long-term (short-term) forecast and decreases in the informativeness of the short-term (long-term) forecast.

One way to test this prediction is to consider firms that operate in multiple industries, that is, conglomerates. In this interpretation, $\bar{I}$ is the total investment of the conglomerate and I_h^* is its allocation of capital to the division with maturity h. We follow this approach in Section V.C.4, where we test whether as the horizon maturity of a division increases, investment in this division becomes more sensitive to the informativeness of the long-term signal and less sensitive to the informativeness of the short-term signal, controlling for the conglomerate investment($\bar{I}$) with firm-time fixed effect

The efficient level of investments in the short-term and long-term projects (denoted I^e_{st} and I^e_{lt}) are obtained when $\omega = 0$ (the manager maximizes the long run value of the firm). Thus, from Proposition 2, $I^e_{st} = I^e(\bar{I})$ and $I^e_{lt} = \bar{I} - I^e(\bar{I})$. The expressions for I^*_{st} and I^*_{lt} show that in general the investment chosen by the manager deviates from the efficient allocation as in the baseline case. However, in contrast to the baseline case, there can be underinvestment ($I^*_h < I^e_h$) or overinvestment ($I^*_h > I^e_h$) in the project with maturity h. In particular, there can be overinvestment in the long-term project (and therefore underinvestment in the short-term project) when $\kappa(1+r) > \frac{2-R^2_{lt}}{2-R^2_{st}}$.[15] As R^2_{lt} increases, the risk of overinvestment in the long-term project increases. This implication highlights again the importance of the horizon of the information produced by the stock market. If investors focus too much on the production of long-term information, one can obtain situations in which managers' short-termism can lead the manager to invest too much in long-term projects, especially if r and κ are large.[16]

C Discussion and additional extensions

Public information vs. private information: The assumption that signals are private is not key for our testable implications. Consider again the baseline version of the model and the polar case in which the signals are public information (i.e., observed by the market

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[15] In the knife-edge case in which $\kappa(1+r) = 1$, it is efficient to allocate capital equally between the two divisions. However, this is not the case if the informativeness of the long-term signal is different from the informativeness of the short-term signal.

[16] Managerial myopia does not necessarily imply that managers invest too much in short-term projects. It just means that they deviate from the maximization of the firm long run value. Bebchuk and Stole (1993) also obtain the possibility of overinvestment in a long-term project when a short-termist manager allocates a fixed amount of capital between a short-term and a long-term project. However, in Bebchuk and Stole (1993), this never happens in the case in which the firm investment cannot be perfectly observed. In Bebchuk and Stole (1993), the information possessed by investors about future cash-flows when the stock price is set plays no role (investors are implicitly assumed to have no information on the cash-flow of the long-term project when investment is non observable). As our analysis shows, this is not innocuous since when investors have too good long-term signals relative to short-term signals, one can also obtain overinvestment in long-term projects even if the manager's investment is not observed.

maker). In this case, the price at date 1 is:

$$\begin{aligned} p_1^{*public}(s_{st}, s_{lt}; I_b, I_m, h) &= \mathrm{E}(V(I_b^*, h)\,|s_{st}, s_{lt}) \\ &= (\frac{(1-h)\kappa}{(1+r)} R_{st}^2) s_{st} + (\frac{h}{(1+r)^2} R_{lt}^2) s_{lt}, \end{aligned}$$

and therefore the expected price at date 0 is

$$\mathrm{E}(p_1^{*public}(s_{st}, s_{lt}; I_b, I_m, h)) = (\frac{(1-h)\kappa}{(1+r)} R_{st}^2 + \frac{h}{(1+r)^2} R_{lt}^2) I_m = 2\gamma(R_{st}^2, R_{lt}^2, h) I_m. \qquad (21)$$

It follows immediately that Proposition 1 still holds. The only difference is that $\gamma(R_{st}^2, R_{lt}^2, h)$ is multiplied by 2. Hence the level of investment is larger when signals are public than when they are private. The reason is that the stock price better reflects the fundamental value of the firm given its investment when the signals are public. When they are private, the equilibrium stock price is less informative about the fundamental value of the firm because the informed investor trades strategically on her information, which reduces the amount of information impounded into prices.[17] As a result, the level of investment is smaller with private information than with public information. However, it does not alter our main prediction regarding the sensitivity of investment to the informativeness of the short-term and the long-term signals for investments with different maturities.[18]

Multiple Informed Traders: For simplicity, we have assumed that there is only one informed investor. However, this assumption is not key. It just reduces the informativeness of the order flow for the dealer, holding the informativeness of signals (R_{st}^2 and R_{lt}^2) constant. When the number of informed investors increases, the sensitivity of the expected stock price to investment increases from γ (the case with one informed investor) to 2γ (when the number of informed investor is infinite), as in the public information case because, as the number of informed investors becomes infinite, the order flow becomes fully informative about informed investors' signals. Thus, the model implies that effects should be stronger

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[17] This comparison is other things equal. It is possible that, in reality, public signals are less informative than private signals. However, this does not affect our predictions regarding the effects of varying the informativeness of short-term and long-term signals of a given type (public or private).

[18] Similarly, Corollary 1 and Proposition 2 still hold. The only difference is that when the signals are public, investment inefficiencies vanish when both signals become perfect. This is not the case when signals are private because even when they are perfect, they are not fully revealed via the trading process (due to noise trading).

in markets with more informed traders, assuming that this number does not directly affect the informativeness of signals.[19]

Stock price informativeness vs. signals informativeness: In our model, an increase in the informativeness of the signal at a given horizon makes the stock price at date 1 more informative about the firm fundamental value (i.e., it reduces $Var(V(I_m^*, h)) \mid P)$, the residual uncertainty about V after observing the price). However, our main predictions cannot be tested with a proxy for price informativeness in place of separate measures for the informativeness of long-term and short-term signals. Indeed, when the informativeness of the long-term signal and the short term signal vary in opposite directions (as is the case over the long run; see DFF2021), the net effect of price informativeness on investment is ambiguous. To see this, consider a firm whose investments have a short-maturity (h small) and suppose that, for this firm, the informativeness of the short-term signal increases while the informativeness of the long-term signal decreases by a much larger amount. As h is small, the informativeness of the price about future short-term cash-flows (θ_{st}) increases. However, investment can drop because R^2_{lt} drops by a larger amount than R^2_{st} (see eq.(14)). In sum, the variations of R^2_{lt} and R^2_{st} have separately more explanatory power to understand variations of investment than the variations in price informativeness (which reflects a weighted average of the informativeness of short-term and long-term signals).

IV Data and measurements

To test the predictions of the model, we need measures of (i) the maturity of firms' investment projects (h), and (ii) the informativeness of investors' signals about short-term and long-term cash flows (R^2_{st} and R^2_{lt}). This section explains how we construct these measures (Appendix I provides a summary of all the variables used in our tests and their definition).

A Project horizon (h)

We use the horizon of firms' business plans as a proxy for the maturity of their investment projects. Business plans describe companies' objectives, and detail the time-frame and in-

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[19] In reality, informed investors may choose to invest less in information when there are more informed investors since the return on the cost of producing information decreases with the number of informed investors.

vestments needed to achieved these objectives as well as the associated cash-flow projections. Thus, variations in the horizon of business plans should correlate positively with variations in the maturity of the corresponding projects' cash-flows.

We measure the horizon, h, of business plans from the text of firms' disclosures. We systematically search for the terms "year business plan", "year strategic plan", "year growth plan", "year investment plan", "year capital expenditure plan", "year expansion plan", "year development plan", "year extension plan", and "year plan" through the content of all SEC filings (including 10Ks, 10Qs, 8Ks,...) between 1994 and 2015. We find 13,908 filings matching at least one of the above expressions. We drop cases where the horizon cannot be identified (e.g., when managers refer to their "multi-year" plan) and then hand-collect the information about the horizon in number of years when it is explicitly mentioned (e.g., "3-year business plan" or "5-year strategic plan"). When several horizons are mentioned in the same filing, we take the average horizon. For example, if managers refer to their "3 to 5 year plan", we assign an horizon of 4 years. In this set of filings, the shortest horizon is 1 year and the longest is 30 years (e.g., Huntington Ingalls Industries (shipbuilding), Oklahoma Gas & Electric (utilities), or Molycorp (mining)). At the end of this process, we obtain information on the horizon of the business plans for 3,925 distinct firms over the 1994-2015 period.

[Insert Figure II about here]

On average, business plan horizon is 4.3 years. Figure II shows that 3-year and 5-year horizons are the most commonly used horizons. Most of the heterogeneity is cross-sectional, suggesting that the horizon of a firm's business plan is highly persistent. Indeed, firm fixed effects explain up to 70% of variation in business plan horizon. Business plan horizon also clusters by industry. This persistence within firm over time, and across firms within industry is consistent with our conjecture that the horizon of the projects that firms undertake primarily reflects permanent economic characteristics due to business specificity such as the length of production and consumption cycle or the useful life of assets. These are outside managerial control, as assumed in the baseline version of our model.

In our test, we focus on the average horizon by two-digit SIC industry across all available filings, denoted *Project Horizon. Project Horizon* is thus time-invariant. Moreover, for any given firm i, *Project Horizon*$_i$ corresponds to its industry average, even if i never mentions the horizon of its business plan. This aggregation serves three purposes. First, it allows us to extract the time-invariant component of projects maturity by industry and thus to better identify structural differences in investing horizon across firms. Second, it reduces noise coming from heterogeneous capital budgeting practices. Third, it increases the power of our tests, since we can include all firms with known industry.

[Insert Table I and Figure IIIabout here]

Table I shows the ranking of industries with the longest horizons (left panel) and the shortest ones (right panel). Firms in the "utility", "mining", "steel", and "ship building" industries use the longest business plans, and firms operating in "defense", "candy and soda", "banking" and "health services" use the shortest ones.[20] This ranking is consistent with Graham (2022). His survey data indicate that the shortest expected life for new projects is in "retail" and "finance", and the longest in "tech" and "manufacturing".[21] Figure III shows that our horizon measure closely matches his project life measure for the six sectors he uses. The differences in number of years between the two measures are never statistically significant, and the correlation between the two exceeds 0.9. Our maturity rankings are also in line with Hubert de Fraisse (2022) and Dew-Becker (2012) who use accounting depreciation rates to measure horizon.[22]

One benefit of our measure compared to (the inverse of) accounting-based depreciation rates is that it is better connected to the real life of the project. For example, some assets may fully depreciate (e.g. software) before the project actual termination, while others may never depreciate (e.g. land) despite the project having finite horizon.[23] Another benefit of

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[20] Business plan horizon is surprisingly short for firms in the "Defense" industry. This is because the demand for firms in this industry depends on the Bipartisan Budget, which is a two-year plan that sets spending for the Pentagon and other federal agencies.

[21] See Figure 7, Panel B on Page 25 in Graham (2022).

[22] In on-line appendix, we show that our results are identical when using this accounting-based approach as alternative measure for project horizon by industry, or when using measures for firm cash-flows duration.

[23] Another weakness of depreciation-based measures inferred from accounting statements is that they depend on past investment and the age of existing assets. Little depreciation could indicate that the assets employed have a long useful life, or that these assets are obsolete and need to be replaced. Because depreciation rates reflect asset obsolescence speed, they will tend to systematically capture re-investment needs.

our measure is that it is an *ex-ante* measure of horizon that does *not* depend on past, current, or expected future investment choices (as is the case for price-based duration measures or duration measures using ex-post cash flow realizations).

B Investors' signals informativeness (R^2)

We obtain variation in the overall informativeness of signals available to investors for cash-flows realized at different horizons from the forecasts of sell-side analysts. Following a large literature on beliefs formation and asset prices, we assume that sell-side analysts forecasts are overall representative of investors' beliefs, and that these forecasts are a good approximation for the signals available to investors at short and long horizons (e.g., Landier and Thesmar (2020) or Hong, Wang, and Yang (2021)).

More specifically, we capture the informativeness of investors' signals about cash-flows at short and long horizons using the measure developed by DFF2021. DFF2021 measure the informativeness of the forecasts issued by an analyst at a given time for a given horizon by the R-squared (R^2) of a regression of the realized earnings (of the firms she covers) on the forecasted earnings, based on data from I/B/E/S. Higher R^2 implies that the forecasts of a given analyst for a given horizon explain a larger fraction of realized earnings at that horizon, and thus that her forecasts are more informative. They consider horizons ranging from one day to five years. We use the same analyst-date-horizon R^2 data as DFF2021 and we average the informativeness across all available analysts by year and horizon. We focus on two aggregate proxies for investors' signals' informativeness for each year t: one for short-term horizons (from 12 months to 23 months), denoted $R^2_{st,t}$ (a proxy for R^2_{st} in our theory), and another one for long-term horizons (from 24 months to 59 months), denoted $R^2_{lt,t}$ (a proxy for R^2_{lt} in our theory).

We consider the above aggregate measures of signals' informativeness, as opposed to firm-level measures for four main reasons. First, aggregation reduces measurement error. This is especially important because forecast informativeness are noisy at the level of analyst, especially long-term forecasts. Second. aggregation avoids reverse causality concerns, since firm-specific variation in investment is unlikely to affect the informativeness of forecasts made by *all* analysts. Third, aggregation mitigates concerns about omitted variables because *aggregate* variation in forecasts informativeness that is common to all analysts should be arguably less related to the characteristics of individual firms and analysts. Finally, the aggregation of $R^2_{st,t}$ and $R^2_{lt,t}$ reflects the informativeness of the forecasts for distinct horizons made by a myriad of analysts, and are thus more likely to capture overall investors' signals about cash-flows materializing in the the short-term or long-term.

Table IA.1 in online appendix reports the aggregate value of $R^2_{st,t}$ and $R^2_{lt,t}$ by year between 1993 and 2015. Short-term forecasts are more informative than long-term forecasts. Moreover, the informativeness of short-term forecasts has improved over time, as R^2_{st} increases by 0.3 percentage points per year, and the increase is statistically significant with t-statistics of 2.57. In contrast, the informativeness of long-term forecasts has deteriorated, with R^2_{lt} decreasing by 0.2 percentage points per year, a trend that is also significant (t-statistic of -1.76).[24] The (pearson) correlation between the two time series is 0.34, indicating a substantial variation in the relative informativeness of investors' signals about short and long horizon cash-flows.

V Empirical evidence

This section tests Proposition 1. We study how different firms (some with short-maturity projects and others with long-maturity projects) adjust their investment in response to changes in the informativeness of investors' signals about short and long-term cash-flows.

A Baseline specification

Our main specification derives from the theory (see Section III). We estimate eq.(14) in the data and test whether $\alpha_4 > 0$ and $\alpha_3 < 0$ by estimating:

$$\begin{aligned} Capex_{i,t} = b_1(\text{Project Horizon}_i \times R^2_{lt,t-1}) + \\ + b_2(\text{Project Horizon}_i \times R^2_{st,t-1}) + \gamma X_{i,t-1} + \phi_i + \eta_t + \varepsilon_{i,t} \quad (22) \end{aligned}$$

where $Capex_{i,t}$ is the capital expenditures (scaled by lagged PPENT) of firm i in fiscal year t, Project Horizon$_i$ is the average investing horizon in firm i's industry, and $R^2_{st,t-1}$ and $R^2_{lt,t-1}$

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[24] Economic magnitude for the two opposing trends differs from Dessaint, Foucault, and Fresard (2021) because the time perod is different, and the definition we use for short and long horizon as well.

are aggregate measures for the informativeness of investors' signals about short and long-term cash flows. The main coefficients of interest are b_1 and b_2 (the empirical counterparts of α_4 and α_3 in eq.(14)). Proposition 1 predicts that investment sensitivity to the informativeness of investors' long-term signal increases with project horizon (i.e., $\alpha_4 > 0$ in eq.(14)), and thus that $b_1 > 0$. In contrast, the sensitivity of investment to the informativeness of investors' short-term signal should decrease with investment maturity (i.e., $\alpha_3 < 0$ in eq.(14)), implying $b_2 < 0$. Therefore, Proposition 1 predicts $b_1 > 0$ and $b_2 < 0$ in eq.(22).

We estimate eq.(22) with firm (ϕ_i) and fiscal year (η_t) fixed effects and include control variables for known determinants of investment, namely, the log of total assets, cash flows, the inverse of PP&E, and Tobin's Q. The fixed effects and control variables aim at capturing determinants of investment that are absent from our model but could nevertheless influence the estimation of b_1 and b_2.[25] We cluster standard errors by SIC2 and fiscal year.

We estimate eq.(22) on a sample comprising all U.S. firms from Compustat (fic=USA, loc=USA, and curcd=USA) that (i) are not active in the financial sector (SIC between 6000 and 6999) or the utility sector (SIC between 4900 and 4999), (ii) have non-missing information on total assets, sales, capital expenditures, property, plant and equioment (PP&E), equity, debt, cash and net income, and (iii) can be merged with CRSP and I/B/E/S. We further require that total assets and sales are both greater than \$1 million, and that sales are greater than net income. The sample starts in 1994, when SEC filings became available in electronic format, and ends in 2015 as R^2 for long-term forecasts cannot be estimated after because earnings realizations are not yet available.

[Insert Table II about here]

Table II shows summary statistics. On average, *Capex* is 0.33, Project Horizon is 4.35 years. In line with DFF2021, who show that the term-structure of forecasts informativeness is downward slopping, R^2_{st} is approximately 60% in this panel, and is greater than R^2_{lt} (approximately 40%). All other variables are defined in the Appendix. Variables based on Compustat data are winsorized by fiscal year at the 2% level in each tail.

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[25] Notice the fixed effects absorb the direct effects of h s well as R^2_{st} and R^2_{lt}

B Main results

Table III presents various estimations of eq.(22). The first column reports results obtained without the inclusion of control variables nor firm fixed effects, exploiting solely the cross-sectional variation in investment observed in a given year across firms with short and long projects' horizons. Supporting our predictions, we observe that $b_1 > 0$ and $b_2 < 0$, and both are statistically significant. All else equal, firms with longer project horizons invest more than firms with shorter horizons in years in which the informativeness of investors' long-term signals is high. Similarly, firms with shorter project horizons invest more than firms with longer horizons when the informativeness of investors' short-term signals is high.

[Insert Table III about here]

Column (2) and (3) show similar results when controlling for firm fixed effects as well as for firms' size, capital stock, cash flows and Q. A specification with these controls, especially the inclusion of Q, is particularly important since it further lessens the concerns that the results stems from a correlation between the informativeness of investors' short and long-term signals and firms' (time-varying) characteristics, such as their size or the attractiveness (i.e., expected cash flows) of their investment projects at different horizons, or variation in discount rates (as suggested by the model). Indeed, investors may have more informative signals at short (long) horizons for larger (smaller) firms or when firms have more (less) valuable opportunities at specific horizons. Our use of aggregate (as opposed to firm-specific) signals informativeness is designed to limit this concern. The stability of the results obtained with controls for firms' time-varying characteristics should further alleviate it.

To further address the potential correlation between the informativeness of investors' signals and firms' characteristics (other than the horizon of their projects), we add interaction terms between each control variable and both measures of signals' quality ($R^2_{st,t-1}$ and $R^2_{lt,t-1}$). The results, reported in Column (4), are unchanged. In addition, in the last column of Table III, we alter the estimation approach and replace OLS by the cumulant estimator developed by Erickson, Jiang, and Whited (2014) to further make sure that our results are not due to unobserved investment opportunities that might correlated with signals' informativeness.

Existing research indicates that Q (the ratio of market value to assets) might be a poor proxy for firms' investment opportunities, leading to biased estimates in investment specifications like ours. However, we obtain similar conclusions when we limit these biases following Erickson, Jiang, and Whited (2014).

In online appendix, we show that these results are robust to using alternative measures of firms' project horizons (see Table IA.2). In particular, we reach similar conclusions when we capture projects' horizons using the measure of equity duration developed by Goncalves (2021) or that of Weber (2018). Our results also hold when we proxy for projects' horizons using sales growth (i.e., higher growth reflecting longer horizons) as well as the inverse of firms' depreciation rates, following Hubert de Fraisse (2022) (i.e., lower depreciation of assets reflecting longer horizons).

C Ancillary results

The results so far corroborate the model's main prediction: the sensitivity of firms' investment to the informativeness of investors' long-term signals increases with the horizon of firms' project horizon while the sensitivity to the informativeness of investors' short-term signals decreases with project horizon. To ensure that this result stems from the mechanisms highlighted by the model, we test four ancillary predictions.

C.1 Differential effects by managerial incentives (ω)

First, as shown in our theoretical analysis, an increase in the sensitivity (ω) of a manager's objective function to her current stock price should make the effects documented in the previous section stronger. That is, the positive (negative) effect of investment maturity on the sensitivity of a firm investment to the informativeness of investors' long-term (short-term) signal should be stronger when managers care more about the impact of their decision on their short run stock price.

We test this prediction using four groups of variables used by prior research as proxies for the extent of managerial myopia: managers' compensation schemes (e.g., Edmans, Fang, and Lewellen (2017)), investors' short-term focus (e.g., Derrien, Kecskes, and Thesmar (2013)), firms' reliance on external financing (e.g., Baker, Stein, and Wurgler (2003)), and takeover pressures (e.g., Stein (1989)).

First, we rely on the scaled wealth-performance sensitivity developed by Edmans, Gabaix, and Landier (2009) (i.e., the dollar change in CEO wealth for a 100 percentage point change in firm value, scaled by annual compensation) and the fraction of equity shares owned by the CEO as proxy for managers' short-term incentives stemming from their compensation schemes. Second, we follow Derrien, Kecskes, and Thesmar (2013) and use the fraction of institutional investors with short horizons (measured by their portfolio turnover) in a firm's ownership as another proxy for ω. Third, we measure firms' need to tap markets based on the predicted likelihood that they will issue stocks in the next 12 months as well as the maturity of their debt. Fourth, we measure firms' exposure to takeover pressure using the presence a poison pill or a classified board, and firms' takeover defense score (from Capital IQ) which summarizes the strength of takeover defenses (across various aspects of corporate governance and takeover defenses mechanisms). Finally, we develop a text-based measure of managers' short-term orientation as the fraction of words in SEC filings referring to "short-term" (i.e., "short-term", "short-run", "current" and "currently") over words referring to both "short-term" and "long-term" (i.e., "long-term" and "long-run"). We present the detailed construction of these variables is in the Appendix, and the summary statistics in Table II .

[Insert Table IV about here]

To test whether the joint effects of horizon and investors' signal informativeness on investment is stronger when managerial myopia is more prevalent (i.e., larger ω), we augment eq.(22) by interacting R^2_{st}, R^2_{lt}, project horizon, and their respective interaction with binary variables indicating whether each (lagged) proxy for ω is above the sample mean (or positive if the proxy in binary). The coefficients of interest in these augmented models are those on these two triple interactions. Consistent with the model's prediction, Table IV confirm that, across all eight proxies, the effects documented in Table III are more pronounced when managers have stronger incentives to maximize their current stock price (i.e., managerial myopia is more likely). For instance, the results indicate that firms with longer project horizons invest more than firms with shorter horizons when the informativeness of investors' long-term signals is high, only when CEOs' wealth-performance sensitivity or equity ownership is above average. Firms with shorter project horizons invest more than firms with longer horizons in years in which the informativeness of investors' short-term signals is high, only when investors' horizon is short or when managers focus predominantly on the short-term in the text of their filings.

C.2 Differential effects by investment observability

As is common in the literature on short-termism (e.g., Fishman and Hagerty (1989), Stein (1989), or Edmans (2009),), we have assumed that the manager's investment decision at date 0 is not observed at date 1. This assumption can be relaxed to some extent: our predictions hold as long as *part* of the firm's investment is unobserved by investors at date 1.[26] However, when investment is fully observed, the manager makes the efficient decision independently of the informativeness of investors' signals. Thus, effects predicted by the model should be weaker for firms that provide better and more timely information about their investment. In this section, we test whether this is the case using three measures of the timeliness of firms' information on their investment.

First, we consider the average time lag (in days) between the date of the announcement of firms' earnings and their reported financial statements. We conjecture that a longer lag reflects less timely available information on investment. The effects documented in Table III should thus be more pronounced when reporting lags are longer. Second, we consider issues an investment guidance about the dollar amount of capital expenditures. Third, we consider whether firms voluntarily discloses information about their investment policy or expansion plans through press releases and company communication. More guidance and voluntary disclosure about investment should provide investors with more timely information about firms' investment.

[Insert Table V about here]

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[26] One possible reason is that date 1 (the horizon at which the manager cares about her stock price) arises before the firm releases information about its investment. For instance, Edmans, Fang, and Lewellen (2017) show empirically that managers cut investment (and sell equity) in the quarter in which large amounts of equity vest, presumably before annual investment is observed by investors.

We again introduce interaction terms between our main explanatory variables and these three proxies (denoted ψ) in eq.(22), and focus on the triple-interaction coefficients. Table V confirms the empirical relevance of our assumption. The first column indicates that the difference in investment sensitivity to the informativeness of long-term forecasts between firms with short and long horizon projects concentrates on firms with longer reporting lags. The remaining two columns show that this difference narrows significantly when firms produce more information about their investment through guidance and specific disclosures.

C.3 Differential effects by cost of capital (r)

Next we test whether the difference in investment sensitivity to the informativeness of short and long term forecasts between firms with short and long horizon projects is weaker when discount rates are higher, as our model predicts. To test this prediction, we estimate a weighted average cost of capital for every firm in every year of our sample (hereafter $wacc_{i,t}$).[27]. Then we introduce this variable in our main specification using the same triple-interaction approach as before. Specifically, we interact our main explanatory variables with the inverse of $(1 + wacc_{i,t})$.[28] All results are reported in Table VI.

[Insert Table VI about here]

In column (1), we use the equity risk premium of Martin (2016) to first calculate the cost of equity, and then the WACC. We find that the regression coefficient on the first triple interaction is positive and significant. This positive interaction means that when the WACC is larger (and thus $(1 + wacc)^{-1}$ is lower), the difference in investment sensitivity to the informativeness of long-term forecasts between firms with short and long horizon projects becomes weaker. While firms with long-horizon projects usually increase investment more than firms investing in short-horizon projects when the informativeness of long-term forecasts improves, this differential effect weakens when future cash flows are more heavily discounted. The same symmetric effect is observed for the investment sensitivity to the informativeness of short term forecasts. The coefficient on the second triple interaction is indeed negative

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[27] We provide a detailed description of the method we use to calculate the WACC in Appendix I.

[28] We do not directly interact with $wacc_{i,t}$ because the discounting function is not linear but obtain similar results if we do.

and significant. This negative coefficient means that while investment sensitivity to the informativeness of short-term forecasts is typically lower for firms investing in long-horizon projects, this difference also attenuates when the discount rate increases. The rest of the table shows similar results when calculating the cost of equity (and then the WACC) using the equity risk premium from other sources.

C.4 Extension to multi-division firms

Finally, we test Proposition 2. As explained in Section II.B, another way to test our theory is to consider multi-division firms. Proposition 2 implies that an increase in the informativeness of short-term signals should lead these firms to shift capital from divisions with long-term projects to divisions with short-term projects and that an increase in the informativeness of long-term signals should have the opposite effect.

To test this prediction, we focus on multi-divisions firms operating across multiple industries (i.e., conglomerates). These firms can more easily alter the average horizon of their projects by shifting investment across divisions. Focusing on conglomerate enables us to test whether, holding total investment fixed, firms reallocate capital toward divisions with shorter projects' maturity when the informativeness of investors' short-term signals increases or the informativeness of their long-term signals decreases. To do so, we estimate the following specification:

$$\begin{aligned} Capex_{i,d,t} = {} & b_1(\textit{Project Horizon}_{i,d} \times R^2_{lt,t-1}) + \\ & + b_2(\textit{Project Horizon}_{i,d} \times R^2_{st,t-1}) + \gamma X_{i,d,t-1} + \omega_{i,t} + \varepsilon_{i,d,t} \end{aligned} \tag{23}$$

where $Capex_{i,d,t}$ is the capex of division d of firm i in year t. The project horizon of each division, $\textit{Project Horizon}_{i,d}$, corresponds to that of its corresponding industry. $R^2_{st,t-1}$ and $R^2_{lt,t-1}$ are defined as before. We include firm×year fixed effects ($\omega_{i,t}$) to absorb any time-*varying* unobserved firm-specific characteristics (e.g., discount rates) that may correlate with the informativeness of investors' signals, firms' project maturity, and their overall investment level. The vector X includes (lagged) control variables, namely, the log of division assets, one divided by the division depreciation and amortization, and the average Tobin's Q of the corresponding industry as proxy for the division's investment opportunities. We cluster standard errors by SIC2 and year.

For this test, we use Compustat Segment data and define divisions by aggregating conglomerates' activities (e.g., investment or assets) in specific (two-digit SIC) industries. We keep all U.S. firms with at least two divisions in a given year that (i) are not active in the financial (SIC between 6000 and 6999) or utility sectors (SIC between 4900 and 4999), and (ii) have non-missing (non-negative) assets and sales. As before, we focus on the period between 1994 and 2015. Because property, plant and equipment is not well populated at the division level, we define division's investment as capital expenditures divided by depreciation and amortization. A ratio greater than 1 indicates that the amount of net invested capital in the division increases. Table IA.4 in on-line appendix presents summary statistics for the conglomerate sample and shows that the average division's investment ratio is 1.24. All other variables are defined in the Appendix. Variables based on Compustat data are winsorized by fiscal year at the 1% level in each tail.

[Insert Table VII about here]

The coefficients of interest in eq.(23) are again b_1 and b_2. They measure the sensitivity of conglomerates' internal allocation of capital across divisions to changes in the informativeness of investors signals at long and short horizons. Proposition 2 predicts that $b_1 > 0$ and $b_2 < 0$. Table VII shows that this prediction is supported by the data, across all specifications. Consistent with our theory, conglomerates lengthen (shorten) the maturity of their overall projects by allocating more (less) capital to divisions with longer project horizons when the informativeness of investors' long-term signals improves (deteriorates). In contrast, they decrease their average projects' maturity by allocating more (less) capital to divisions with shorter project horizons when investors' short-term signals informativeness increases (decreases). The estimates of b_1 and b_2 are statistically significant in all specifications. They hold with or without controls, and irrespective of the estimation methods (i.e., OLS or the cumulant estimator of Erickson, Jiang, and Whited (2014)).

VI Ending discussions

A Robustness and alternative explanations

Our findings are consistent with our predictions: Investment sensitivity to long(short)-term R^2 increases(decreases) with project horizon. Moreover, the heterogeneity of this effect across firms can be explained by our theory.

Unobserved aggregate factors may correlate with R^2_{lt} and/or R^2_{st} and thus confound one of our results; but to confound our theory, such omitted factor should confound all of them. For that, this factor should simultaneously explain why $b_1 > 0$ *and* $b_2 < 0$ in eq.(22). Because R^2_{lt} and R^2_{st} are *positively* correlated, this requires that the correlation of this omitted factor with R^2_{lt} and its correlation with R^2_{st} are of *opposite* sign. Moreover, the interaction between the *same* omitted factor and our proxies for ω, ψ, and r should generate the *same* effects as our theory predicts. We cannot rule out this possibility, but it seems unlikely.

To further mitigate this concern, we perform three types of test. First, we show that our results survive when controlling for a host of macro variables (e.g., GDP growth, VIX, Treasury Yields, ...) capturing variations in economic cycles, uncertainty, and overall financing conditions (See Table IA.7 in Section 4 of the online appendix). Second, we show that these results are also robust to controlling for unobserved trends by Fama-French 17 industry, by state of location and by state of incorporation (See Table IA.8 in Section 5 of the online appendix). Finally, we verify that we are not capturing any pre-trend (i.e., that the observed change in investment is not due to pre-existing forces affecting firms with long-horizon projects and unrelated to variations in R^2_{lt} and R^2_{st}) by estimating the dynamic of capital re-allocation across firms after R^2 changes in a given year. The specification we use for estimating this dynamic is the same as for a generalized diff-in-diff.[29]

[Insert Figure IV about here]

Figure IV displays the results (The graph plots the regression coefficients reported in Table IA.9 in Section 9 of the online appendix). We find no evidence of any pre-trend.

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[29] See for example Table 3, Column 5 in Bertrand and Mullainathan (2003) (among others).

B Implication for shareholder value

We show that the horizon at which financial markets produce information matters for capital allocation across projects with different maturities. A related question is whether it matters for shareholder value as well. Is the shift in capital allocation beneficial or detrimental to shareholders?

Answering this question is difficult because it requires to observe the NPV associated with the projects that firms undertake and those that they did not undertake, which is typically unobserved. To partially address this challenge and provide a first answer to this question, we focus on large scale investments dedicated to the acquisition of private firms for which we observe the market reaction when the project is undertaken. Then we test whether the market reaction to acquiring assets in long-horizon industries improves or deteriorates after R^2 changes.

[Insert Table VIII about here]

We find that the market reaction to acquiring targets active in long-horizon industries increases when available signals about long-term future are more informative. Thus, more information about the long-term is associated with more valuable long-term investments. Likewise more information about the short-term is associated with more valuable short-term investments.

C Aggregate trend in investment horizon

If better information about long(short)-term cash flows generates more investment in long(short)-term projects (as we show), and if market participants have become better (worst) at predicting the short(long)-term future (as documented by DFF2021 and Graham (2022)), then one would expect to observe greater capital allocation to short-term projects over time, and a decreasing trend in investing horizon by US public corporations. Is it the case in the data?

Yes. Table IA.11 in Section 11 of the online appendix shows that there has been greater investment overtime in industries with short maturity projects.

[Insert Figure V about here]

Figure V provides more direct evidence of this aggregate trend focusing on mergers and acquisitions. At the time of deal announcement, managers of the acquiring firm may disclose the horizon at which they expect the synergies to materialize and the deal to be EPS-accretive. Both indicators are direct measures for when the project will start providing benefits to the acquirer. In both cases, we find that this horizon has declined over time. Table IA.12 in Section 11 of the online appendix confirms that this negative trend survives even *after controlling for the market reaction* to deal announcement.

VII Conclusion

Recent research documents that the horizon at which market participants can predict the future has declined over time. We investigate the real effects of this long-run trend on real capital allocation across projects with different maturities. We show that more information production at a given horizon increases managerial incentives to invest at this horizon, at the expense of projects with other maturity. Hence, the horizon at which financial markets produce information matters. More information production about the short-term can crow-out long-term investments.

Preliminary evidence from mergers and acquisitions about the expected horizon of synergy realisation (EPS accretion) corroborate the survey evidence of Graham (2022) and suggest that this crowding-out effect has been at play since the late 1990's.

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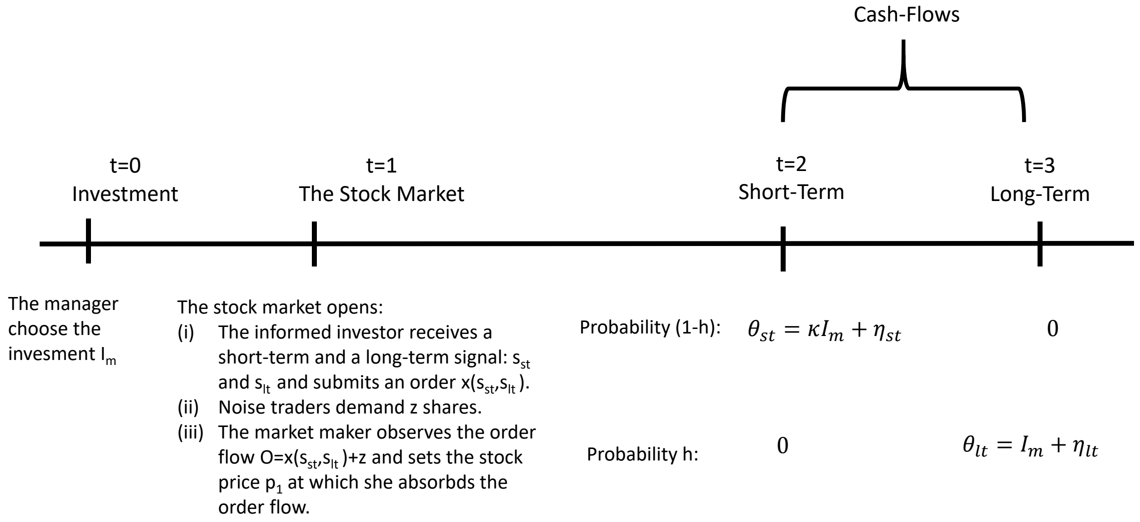
Figure I: Timeline of the model



The manager choose the invesment I_m

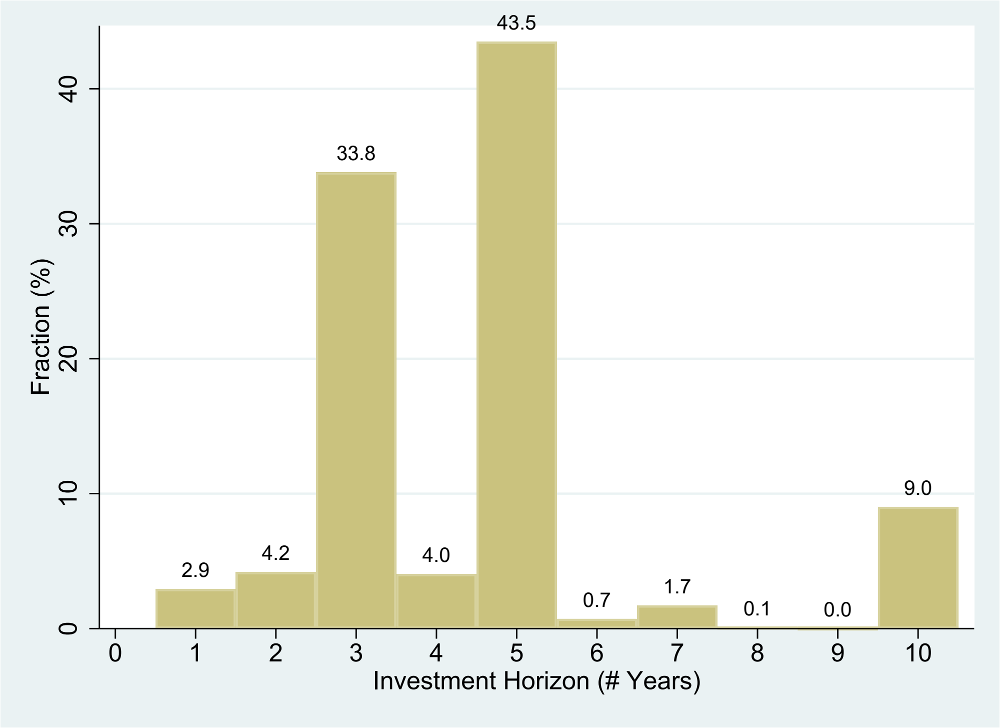
The stock market opens:

(i) The informed investor receives a short-term and a long-term signal: s_{st} and s_{lt} and submits an order $x(s_{st},s_{lt})$.

(ii) Noise traders demand z shares.

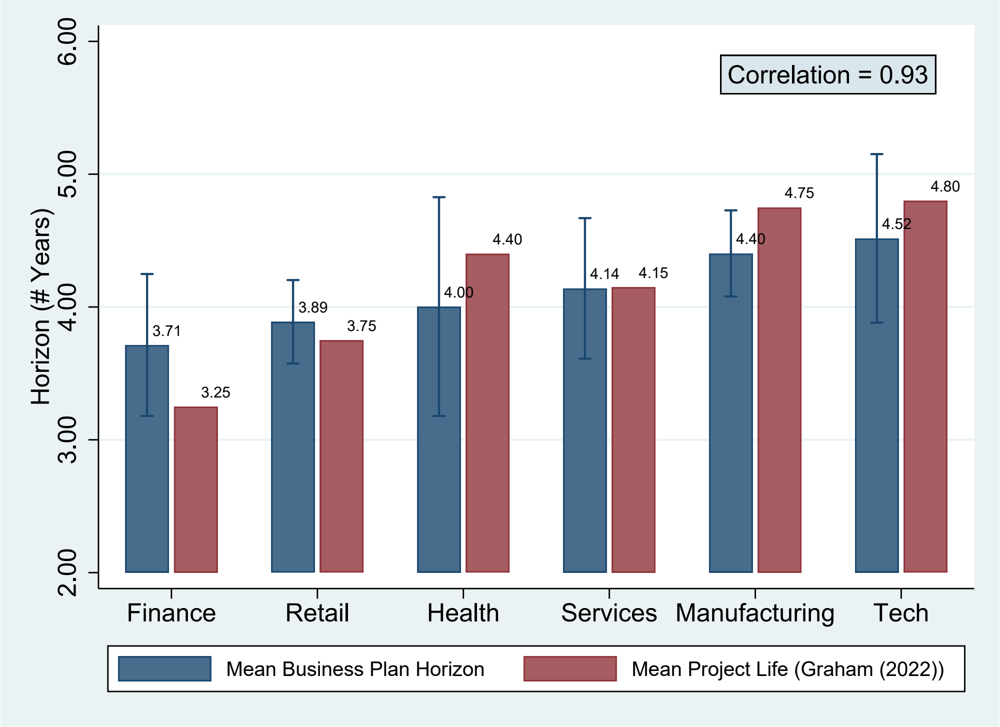
(iii) The market maker observes the order flow $O=x(s_{st},s_{lt})+z$ and sets the stock price p_1 at which she absorbds the order flow.

Figure II: Business plan horizon distribution



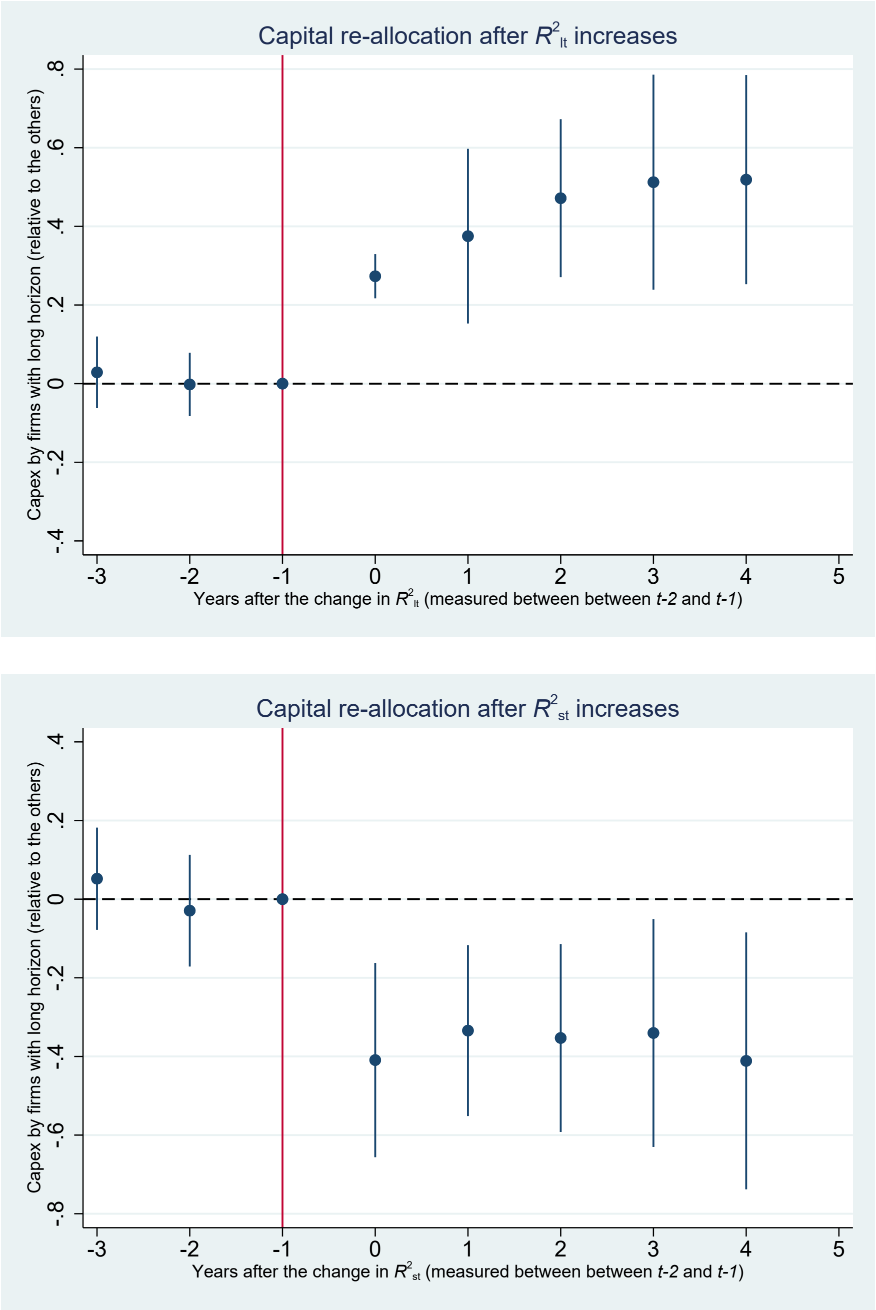
This figure shows the distribution of the horizon of the business plan that managers expect for their firms. The data is hand collected from SEC filings and includes 13,908 observations of business plan horizon mentioned or reported by 3,925 firms between 1994 and 2020. The “10-year Horizon” bin in the graph includes business plan horizons of 10 years and beyond.

Figure III: Comparison with the average project life by sector from Graham (2022)



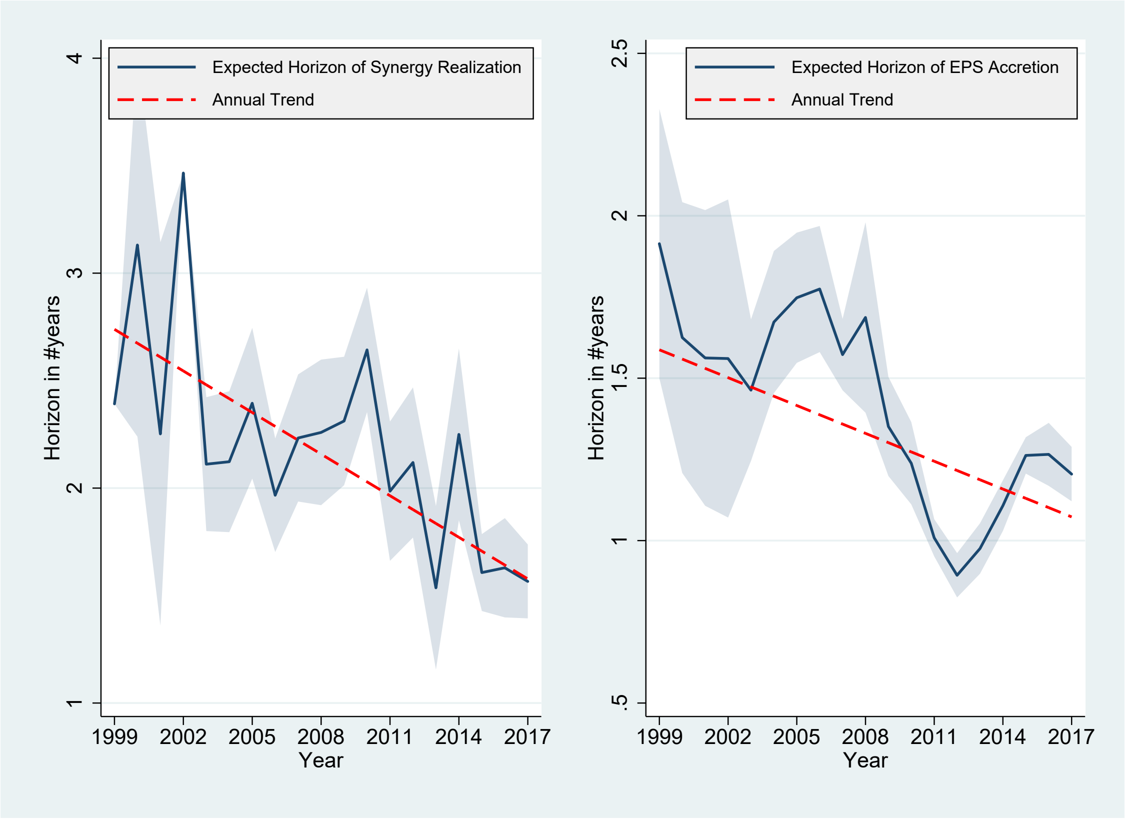
This figure compares the average business plan horizon by sector with the survey data of Graham (2022) about the average expected life for new projects by sector as of 2018 (See Figure 7, Panel B on Page 25 in Graham (2022)). Mean business plan horizon is calculated from a hand collected sample of 13,908 observations of business plan horizon mentioned in the SEC filings of 3,925 firms between 1994 and 2020. Reported confidence intervals are at 99% level.

Figure IV: Capital allocation dynamic between firms



This figure plots the regression coefficients reported in Table 9 of the online appendix (See section 9). The top graph shows how firms with long horizon projects change investment every year relative to firms with short horizon projects after R^2_{lt} improves in a given year, i.e., when the informativeness of long-term forecasts made by all US analysts increases in the reference year. The bottom graph shows how firms with long horizon projects change investment every year relative to firms with short horizon projects after R^2_{st} improves in a given year, i.e., when the informativeness of short-term forecasts made by all US analysts increases in the reference year. The reference year is t-1, and the improvement in R^2 is measured relative to t-2. Reported confidence intervals are at 90% level.

Figure V: Trend in (M&A) project horizon



This figure plots the evolution of the horizon at which managers of the acquiring firm expect their acquisitions to generate synergistic gains (left-graph) and EPS accretion (Righ-graph). Reported confidence intervals are at 90% level.

Table I: Mean business plan horizon by Fama-French 49 industry

This table shows the top-15 industries with longest business plan horizon, and the top-15 ones with shortest business plan horizon. Mean business plan horizon by Fama-French 49 industry is calculated from a hand collected sample of 13,908 observations of business plan horizon mentioned in the SEC filings of 3,925 firms between 1994 and 2020.

FF49 Industries with Longest Business Plan Horizon

Rank	Industry	Mean Business Plan Horizon
1	Utilities	7.15
2	Mining	5.88
3	Steel Works	5.58
4	Shipbuilding, Railroad Equipment	5.56
5	Coal	5.48
6	Business Supplies	4.94
7	Chemicals	4.93
8	Petroleum and Natural Gas	4.92
9	Communication	4.88
10	Shipping Containers	4.85
11	Personal Services	4.84
12	Construction Materials	4.79
13	Electronic Equipment	4.75
14	Aircraft	4.72
15	Construction	4.68

FF49 Industries with Shortest Business Plan Horizon

Rank	Industry	Mean Business Plan Horizon
1	Defense	3.12
2	Candy & Soda	3.36
3	Banking	3.37
4	Health Services	3.39
5	Consumer Goods	3.54
6	Printing and Publishing	3.59
7	Tobacco Products	3.60
8	Apparel	3.66
9	Retail	3.85
10	Food Products	3.89
11	Restaraunts, Hotels, Motels	3.89
12	Insurance	3.90
13	Recreation	3.91
14	Textiles	3.96
15	Wholesale	4.00

Table II: Sample descriptive statistics

This table presents descriptive statistics for the main employed variables in Test#1. The sample includes 66,601 firm-year observations about 8,082 distinct non-financial non-utility US firms in Compustat between 1994 and 2015. Detailed variable definitions are in Appendix I.

	N	Mean	STDV	P10	P25	P50	P75	P90
Main employed variables								
Capex	66,601	0.34	0.34	0.07	0.13	0.23	0.41	0.72
R^2_{st}	66,601	0.59	0.04	0.54	0.56	0.58	0.62	0.65
R^2_{lt}	66,601	0.40	0.05	0.32	0.36	0.40	0.43	0.47
Project Horizon	66,601	4.35	0.51	3.71	3.99	4.38	4.68	4.88
Q	66,601	2.07	1.61	0.93	1.14	1.55	2.35	3.83
Cash Flow	66,601	0.03	0.17	-0.16	0.02	0.08	0.12	0.17
Size	66,601	5.71	1.93	3.32	4.27	5.56	6.98	8.31
Assets	66,601	1,812	5,070	28	72	259	1,073	4,065
Other variables used for cross-sectional analysis								
CEO Wealth Performance Sensitivity	19,449	17.68	28.39	1.81	3.75	7.68	17.03	44.12
CEO Equity Ownership	23,279	2.8%	6.6%	0.0%	0.1%	0.4%	1.7%	8.3%
Short Horizon Institutional Investors	59,219	60.4%	22.6%	29.7%	48.0%	62.9%	76.5%	87.7%
New SEO likelihood	63,350	0.11	0.11	0.03	0.04	0.08	0.13	0.23
Residual Debt Maturity	23,114	2.67	1.07	1.26	1.91	2.60	3.37	4.14
Poison Pill or Class. Board	37,466	0.59	0.49	0.00	0.00	1.00	1.00	1.00
Takeover Defense Score	62,479	0.21	0.15	0.04	0.08	0.18	0.31	0.43
#Mentions of ST vs. LT in SEC filings	54,924	80.5%	10.8%	66.4%	73.1%	80.6%	88.7%	94.7%
Reporting Lag	65,943	31.67	14.05	18.50	23.50	30.00	38.50	45.00
Capex Guidance	66,601	0.15	0.35	0.00	0.00	0.00	0.00	1.00
Expansion Plan Disclosure	66,601	0.17	0.37	0.00	0.00	0.00	0.00	1.00
WACC (Martin (2010))	52,759	8.4%	4.6%	6.3%	7.0%	8.0%	9.2%	10.2%
WACC (Campbell et al. (2008) - In sample)	66,593	11.4%	4.6%	7.8%	9.2%	10.9%	12.6%	14.8%
WACC (Campbell et al. (2008) - Out sample)	66,593	10.6%	4.5%	7.5%	8.7%	10.6%	12.3%	13.3%
WACC (Damodaran (2022))	66,593	8.0%	4.1%	6.6%	7.1%	8.0%	8.7%	9.5%

Table III: Capital allocation across firms

This table presents estimates of firm-level investment equations. The dependent variable is $Capex_{i,t}$ defined as capital expenditures scaled by lagged PPENT. Project Horizon$_i$ is the average horizon of investment projects, which we proxy by the average horizon of the business plan that firms use in the industry. Project Horizon$_i$ is constant by SIC2-industry and is aimed to capture structural differences in investing horizon across firms. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in I/B/E/S in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in I/B/E/S in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. Both $R^2_{st,t}$ and $R^2_{lt,t}$ are constructed by averaging the measure of analysts' forecasts informativeness by horizon developed by Dessaint, Foucault, and Fresard (2021) across all US analysts by (fiscal) year. Dessaint, Foucault, and Fresard (2021) measures forecasts informativeness by analyst-day-horizon using the R^2 of a regression of realized earnings on forecasted earnings. A higher R^2 indicates that the forecasts of an analyst explain a larger fraction of the variation in realized earnings at this horizon. i indexes firm and t indexes fiscal year. All other variables are defined in Appendix I. Explanatory variables that are collinear with the fixed effects are omitted from the regression. t-statistics in parentheses are based on standard errors clustered in two ways, by SIC2-industry and by fiscal year. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	$\text{Capex}_{i,t}$				
Specification	(1)	(2)	(3)	(4)	(5)
Project Horizon$_i$× $R^2_{lt,t-1}$	0.36***	0.39***	0.34***	0.32***	0.20***
	(4.85)	(3.19)	(3.57)	(3.30)	(9.44)
Project Horizon$_i$× $R^2_{st,t-1}$	-0.31**	-0.36**	-0.29**	-0.28**	-0.17***
	(-2.21)	(-2.59)	(-2.41)	(-2.41)	(-6.07)
Project Horizon$_i$	0.04				
	(0.62)				
1/PPENT$_{i,t-1}$			0.83***	1.05***	0.78***
			(12.43)	(2.73)	(26.06)
Q$_{i,t-1}$			0.08***	0.11***	0.13***
			(13.63)	(3.46)	(40.36)
Cash Flow$_{i,t-1}$			0.32***	-0.09	0.25***
			(10.29)	(-0.41)	(17.33)
Size$_{i,t-1}$			0.01	0.03*	0.02***
			(0.59)	(1.81)	(5.23)
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	Yes	Yes	Yes
Controls Interacted	No	No	No	Yes	No
Estimation Method	OLS	OLS	OLS	OLS	EW GMM
N	66,601	66,601	66,601	66,601	66,601

Table IV: Differential effects by managerial incentives (w)

This table presents estimates of firm-level investment equations. The dependent variable is $Capex_{i,t}$ defined as capital expenditures scaled by lagged PPENT. Project Horizon$_i$ is the average horizon of investment projects, which we proxy by the average horizon of the business plan that firms use in the industry. Project Horizon$_i$ is constant by SIC2-industry and is aimed to capture structural differences in investing horizon across firms. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in I/B/E/S in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in I/B/E/S in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. Both $R^2_{st,t}$ and $R^2_{lt,t}$ are constructed by averaging the measure of analysts' forecasts informativeness by horizon developed by Dessaint, Foucault, and Fresard (2021) across all US analysts by (fiscal) year. Dessaint, Foucault, and Fresard (2021) measures forecasts informativeness by analyst-day-horizon using the R^2 of a regression of realized earnings on forecasted earnings. A higher R^2 indicates that the forecasts of an analyst explain a larger fraction of the variation in realized earnings at this horizon. In column 1, $w_{i,t}$ indicates whether CEO Wealth Performance Sensitivity$_{i,t}$ is above the sample mean. In column 2, $w_{i,t}$ indicates whether CEO Equity Ownership$_{i,t}$ is above the sample mean. In column 3, $w_{i,t}$ indicates whether the percentage of short-term institutional investors (Long-Horizon Institutional Investors$_{i,t}$) is above the sample mean. In column 4, $w_{i,t}$ indicates whether the probability of a SEO is above the sample mean. In column 5, $w_{i,t}$ indicates whether residual debt maturity$_{i,t}$ is above the sample mean. In column 6, $w_{i,t}$ is equal to one if the firm adopted a poison pill or if the board is classified, and zero if not. In column 7, $w_{i,t}$ indicates whether takeover defense score$_{i,t}$ (relative to SIC4 peers) is above the sample mean. In column 8, $w_{i,t}$ indicates whether the percentage of words in SEC filings referring to "short-term" as opposed to "long-term" is above the sample mean. i indexes firm and t indexes fiscal year. All variables are defined in Appendix I. Explanatory variables that are collinear with the fixed effects are omitted from the regression. t-statistics in parentheses are based on standard errors clustered in two ways, by SIC2-industry and by fiscal year. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:				Capex$_{i,t}$				
Proxy for w	CEO Wealth-Performance Sensitivity	CEO Equity Ownership	Institutional Investors Horizon	New SEO Likelihood	Residual Debt Maturity	Poison Pill or C. Board	Takeover Defense Score	#Mentions of ST vs. LT
OLS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Project Horizon$_i \times R^2_{lt,t-1} \times w_{i,t-1}$	0.47**	0.42***	0.26**	0.50***	-0.30**	-0.56**	-1.19**	0.36***
	(2.17)	(3.68)	(2.33)	(4.17)	(-2.59)	(-2.42)	(-2.17)	(3.77)
Project Horizon$_i \times R^2_{st,t-1} \times w_{i,t-1}$	-0.55**	-0.50**	-0.32**	-0.54**	0.30*	0.38***	0.70*	-0.37***
	(-2.15)	(-2.18)	(-2.21)	(-2.57)	(2.02)	(3.04)	(1.73)	(-3.10)
Project Horizon$_i \times R^2_{lt,t-1}$	0.07	0.06	0.19***	0.13*	0.45***	0.68***	0.35***	0.17**
	(0.70)	(0.54)	(2.99)	(1.73)	(5.65)	(3.02)	(3.79)	(2.56)
Project Horizon$_i \times R^2_{st,t-1}$	-0.07	-0.06	-0.11	-0.12*	-0.36**	-0.41***	-0.30**	-0.08
	(-0.95)	(-1.25)	(-1.37)	(-1.93)	(-2.11)	(-2.91)	(-2.45)	(-1.07)
$R^2_{st,t-1} \times w_{i,t-1}$	2.16*	2.04**	1.21*	1.81**	-1.23*	-1.59***	-3.15*	1.43***
	(2.01)	(2.07)	(1.99)	(2.15)	(-1.88)	(-3.06)	(-1.74)	(2.94)
$R^2_{lt,t-1} \times w_{i,t-1}$	-1.93**	-1.86***	-0.64	-1.75***	1.05**	2.33**	5.30**	-1.37***
	(-2.18)	(-2.98)	(-1.39)	(-3.65)	(2.42)	(2.41)	(2.25)	(-2.86)
Project Horizon$_i \times w_{i,t-1}$	0.16	0.14	0.08	0.12	-0.06	-0.02	0.15	0.08
	(1.24)	(1.13)	(1.32)	(0.96)	(-0.68)	(-0.35)	(0.66)	(1.21)
$w_{i,t-1}$	-0.59	-0.51	-0.44	-0.37	0.31	0.08	-0.49	-0.32
	(-1.06)	(-0.99)	(-1.57)	(-0.73)	(0.81)	(0.38)	(-0.50)	(-1.07)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	19,449	23,279	59,219	63,350	23,114	37,466	62,538	54,924

Table V: Differential effects by investment observability

This table presents estimates of firm-level investment equations. The dependent variable is $Capex_{i,t}$ defined as capital expenditures scaled by lagged PPENT. Project Horizon$_i$ is the average horizon of investment projects, which we proxy by the average horizon of the business plan that firms use in the industry. Project Horizon$_i$ is constant by SIC2-industry and is aimed to capture structural differences in investing horizon across firms. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in I/B/E/S in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in I/B/E/S in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. Both $R^2_{st,t}$ and $R^2_{lt,t}$ are constructed by averaging the measure of analysts' forecasts informativeness by horizon developed by Dessaint, Foucault, and Fresard (2021) across all US analysts by (fiscal) year. Dessaint, Foucault, and Fresard (2021) measures forecasts informativeness by analyst-day-horizon using the R^2 of a regression of realized earnings on forecasted earnings. A higher R^2 indicates that the forecasts of an analyst explain a larger fraction of the variation in realized earnings at this horizon. In column 1, $\psi_{i,t}$ indicates whether the log of Reporting Lag$_{i,t}$ is above the sample median. In column 2, $\psi_{i,t}$ indicates whether a guidance was made in I/B/E/S for the corresponding capex (i.e., for the same firm and the same fiscal period). In column 3, $\psi_{i,t}$ indicates whether expansion plans were disclosed. Expansion plans are disclosed if at least one news item#31 is recorded in Capital IQ. Capital IQ defines news item#31 as news related to "the growth of a company, usually by means of increasing their current operations through internal growth, like entering into new markets with existing products, opening a new branch, establishing a new division, increasing production capacity, or investing additional capital in the current business. Growth by acquisition is not covered in this event type." i indexes firm and t indexes fiscal year. All variables are defined in Appendix I. Explanatory variables that are collinear with the fixed effects are omitted from the regression. t-statistics in parentheses are based on standard errors clustered in two ways, by SIC2-industry and by fiscal year. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Capex$_{i,t}$		
Proxy for ψ	Reporting Lag	Capex Guidance	Expansion Plan Disclosure
OLS	(1)	(2)	(3)
Project Horizon$_i$× $R^2_{lt,t-1} \times \psi_{i,t-1}$	0.36**	-0.69***	-0.74***
	(2.25)	(-8.09)	(-3.00)
Project Horizon$_i$× $R^2_{st,t-1} \times \psi_{i,t-1}$	-0.31*	0.31*	0.37**
	(-1.95)	(1.96)	(2.46)
Project Horizon$_i$× $R^2_{lt,t-1}$	0.16*	0.36***	0.38***
	(1.80)	(3.44)	(3.81)
Project Horizon$_i$× $R^2_{st,t-1}$	-0.15	-0.34*	-0.34**
	(-1.63)	(-2.00)	(-2.58)
$R^2_{st,t-1} \times \psi_{i,t-1}$	1.36**	-1.32*	-1.56**
	(2.08)	(-1.86)	(-2.39)
$R^2_{lt,t-1} \times \psi_{i,t-1}$	-1.66**	2.67***	3.27***
	(-2.57)	(6.10)	(3.24)
Project Horizon$_i$ × $\psi_{i,t-1}$	0.05	0.08	0.07*
	(0.52)	(1.27)	(1.87)
$\psi_{i,t-1}$	-0.17	-0.24	-0.35**
	(-0.45)	(-0.90)	(-2.06)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
N	65,925	66,601	66,601

Table VI: Differential effects by cost of capital (r)

This table presents estimates of firm-level investment equations. The dependent variable is $Capex_{i,t}$ defined as capital expenditures scaled by lagged PPENT. Project Horizon$_i$ is the average horizon of investment projects, which we proxy by the average horizon of the business plan that firms use in the industry. Project Horizon$_i$ is constant by SIC2-industry and is aimed to capture structural differences in investing horizon across firms. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in I/B/E/S in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in I/B/E/S in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. Both $R^2_{st,t}$ and $R^2_{lt,t}$ are constructed by averaging the measure of analysts' forecasts informativeness by horizon developed by Dessaint, Foucault, and Fresard (2021) across all US analysts by (fiscal) year. Dessaint, Foucault, and Fresard (2021) measures forecasts informativeness by analyst-day-horizon using the R^2 of a regression of realized earnings on forecasted earnings. A higher R^2 indicates that the forecasts of an analyst explain a larger fraction of the variation in realized earnings at this horizon. $WACC_{i,t}$ is the Weighted Average Cost of Capital, first calculated by firm, then averaged by SIC2-year. Calculation details are provided in the text and in Appendix I. $WACC_{i,t}$ is centered at the mean (for readability of the baseline terms in the regression). In column 1, the source for the equity risk premium is Martin (2016). In column 2 (3), the equity risk premium is estimated every year in-sample (out-of-sample) using the same predictors and the same approach as Campbell and Thompson (2008). In column 4, the source for the equity risk premium is the implied equity risk premium from Damodaran website. i indexes firm and t indexes fiscal year. All variables are defined in Appendix I. Explanatory variables that are collinear with the fixed effects are omitted from the regression. t-statistics in parentheses are based on standard errors clustered in two ways, by SIC2-industry and by fiscal year. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Capex$_{i,t}$			
Proxy for w	Martin (2017)	Campbell & Thomson (2008)-In	Campbell & Thomson (2008)-Out	Damodaran (2022)
OLS	(1)	(2)	(3)	(4)
Project Horizon$_i$× $R^2_{lt,t-1} \times (1+wacc_{i,t-1})^{-1}$	12.75***	13.99**	7.63*	10.77
	(2.84)	(2.39)	(2.01)	(1.13)
Project Horizon$_i$× $R^2_{st,t-1} \times (1+wacc_{i,t-1})^{-1}$	-10.02**	-9.19***	-8.50***	-12.23**
	(-2.41)	(-3.49)	(-2.82)	(-2.16)
Project Horizon$_i$× $R^2_{lt,t-1}$	0.26**	0.23**	0.32***	0.28**
	(2.30)	(2.30)	(3.09)	(2.19)
Project Horizon$_i$× $R^2_{st,t-1}$	-0.28*	-0.36***	-0.37***	-0.30**
	(-1.84)	(-2.89)	(-2.72)	(-2.20)
$R^2_{st,t-1} \times (1+wacc_{i,t-1})^{-1}$	44.6	38.03***	35.63**	48.02**
	(1.55)	(3.19)	(2.65)	(2.16)
$R^2_{lt,t-1} \times (1+wacc_{i,t-1})^{-1}$	-63.78*	-67.28**	-39.29**	-59.55
	(-1.88)	(-2.56)	(-2.35)	(-1.42)
Project Horizon$_i$ × $(1+wacc_{i,t-1})^{-1}$	0.79	-0.15	1.72**	2.43
	(0.44)	(-0.13)	(2.28)	(0.86)
$(1+wacc_{i,t-1})^{-1}$	-0.26	4.5	-4.07	-1.86
	(-0.02)	(0.85)	(-1.29)	(-0.16)
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
N	52,759	66,593	66,593	66,593

Table VII: Capital allocation within firms

This table presents estimates of division-level investment equations. The dependent variable is $Capex_{d,i,t}$ defined as capital expenditures scaled by depreciation at the division-firm-year level. Project Horizon$_{d,i}$ is the average horizon of investment projects by division, which we proxy by the average horizon of the business plan that firms use in the industry of the division. Project Horizon$_{d,i}$ is constant by SIC2-industry and is aimed to capture structural differences in investing horizon across divisions operating different SIC2 industries. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in I/B/E/S in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in I/B/E/S in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. Both $R^2_{st,t}$ and $R^2_{lt,t}$ are constructed by averaging the measure of analysts' forecasts informativeness by horizon developed by Dessaint, Foucault, and Fresard (2021) across all US analysts by (fiscal) year. Dessaint, Foucault, and Fresard (2021) measures forecasts informativeness by analyst-day-horizon using the R^2 of a regression of realized earnings on forecasted earnings. A higher R^2 indicates that the forecasts of an analyst explain a larger fraction of the variation in realized earnings at this horizon. i indexes firm and t indexes fiscal year. All other variables are defined in Appendix II. Explanatory variables that are collinear with the fixed effects are omitted from the regression. t-statistics in parentheses are based on standard errors clustered in two ways, by SIC2-industry and by fiscal year. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:		Division Capex$_{d,i,t}$		
Specification	(1)	(2)	(3)	(4)
Project Horizon$_{d,i}\times R^2_{lt,t-1}$	1.26***	1.19***	1.22***	0.75**
	(3.73)	(3.66)	(3.82)	(2.21)
Project Horizon$_{d,i}\times R^2_{st,t-1}$	-1.09***	-1.02***	-1.03***	-0.36**
	(-3.44)	(-3.31)	(-3.62)	(-1.96)
Project Horizon$_{d,i}$	0.17	0.15	0.15	-0.15
	(0.81)	(0.72)	(0.71)	(-1.25)
1/D&A		0.02	-0.01	0.02
		(0.70)	(-0.03)	(1.18)
Division Q$_{d,i,t-1}$		0	-0.48**	0.06*
		(-0.20)	(-2.63)	(1.74)
Division Cash Flow$_{d,i,t-1}$		0.40***	-1.81**	0.19***
		(3.68)	(-2.63)	(5.39)
Division Size$_{d,i,t-1}$		0.03	-0.14	0.03***
		(1.67)	(-0.82)	(3.19)
Firm x Year FE	Yes	Yes	Yes	Yes
Controls Interacted	No	No	Yes	No
Estimation Method	OLS	OLS	OLS	EW GMM
N	17,416	17,416	17,416	17,416

Table VIII: Large scale capital reallocation efficiency

This table presents estimates of deal-level CAR regressions. The dependent variable is Acquirer $CAR[-1,+1]$. Project Horizon is the average horizon of the investment projects in the target industry (which we proxy by the average horizon of the business plan that firms use in this industry). Project Horizon is constant by SIC2-industry and is aimed to capture structural differences in investing horizon across targets operating in different SIC2 industries. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in I/B/E/S in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in I/B/E/S in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. Both $R^2_{st,t}$ and $R^2_{lt,t}$ are constructed by averaging the measure of analysts' forecasts informativeness by horizon developed by Dessaint, Foucault, and Fresard (2021) across all US analysts by (fiscal) year. Dessaint, Foucault, and Fresard (2021) measures forecasts informativeness by analyst-day-horizon using the R^2 of a regression of realized earnings on forecasted earnings. A higher R^2 indicates that the forecasts of an analyst explain a larger fraction of the variation in realized earnings at this horizon. i indexes deal and t indexes calendar year. Explanatory variables that are collinear with the fixed effects are omitted from the regression. t-statistics in parentheses are based on standard errors clustered by deal announcement date. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable: Specification	Acquirer CAR[-1;+1] (1)	 (2)	 (3)	 (4)
Project Horizon× $R^2_{lt,t-1}$	0.06***	0.05**	0.04**	0.04*
	(3.13)	(2.21)	(2.09)	(1.84)
Project Horizon× $R^2_{st,t-1}$	-0.05**	-0.06**	-0.06**	-0.05*
	(-2.00)	(-2.23)	(-2.09)	(-1.83)
Same Industry			0.00	0.00
			(1.59)	(1.42)
Cross Border			0.00	0.00
			(-1.37)	(-1.47)
Stock Paid			0.00	0.00
			(1.54)	(1.03)
Hostile			0.03***	0.03***
			(2.50)	(2.62)
Relative Size			0.01*	0.01
			(1.64)	(1.60)
Toehold			-0.02*	-0.02*
			(-1.74)	(-1.81)
Acquirer Size			-0.00***	-0.00***
			(-3.85)	(-5.45)
Acquirer Q				0.00***
				(3.29)
Acquirer Cash Flow				0.01
				(1.11)
Acquirer Debt				0.00
				(-0.78)
Acquirer Cash				-0.01*
				(-1.91)
Year FE	Yes	Yes	Yes	Yes
Acquirer SIC2 FE	Yes	-	-	-
Target SIC2 FE	Yes	-	-	-
Target SIC2 x Acquirer SIC2 FE	No	Yes	Yes	Yes
N	10,497	10,497	10,484	10,206

VIII Appendix

Appendix I – Firm-level Variable Definitions

Variable	Definition
Main variables	
Capex	$capx/ppent$ (from last available financial statements in Compustat). $ppent$ is measured at the end of the previous fiscal year ($fyear$).
R^2_{st}	Average informativeness of the short-term forecasts made by all US analysts in I/B/E/S in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. R^2_{st} is obtained by averaging the measure of analysts' forecasts informativeness developed by Dessaint, Foucault, and Fresard (2021) across all US analysts by fiscal year. Dessaint, Foucault, and Fresard (2021) measures forecasts informativeness by analyst-day-horizon using the R^2 of a regression of realized earnings on forecasted earnings. A higher R^2 indicates that the forecasts of an analyst explain a larger fraction of the variation in realized earnings at this horizon.
R^2_{lt}	Average informativeness of the long-term forecasts made by all US analysts in I/B/E/S in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. R^2_{lt} is obtained by averaging the measure of analysts' forecasts informativeness developed by Dessaint, Foucault, and Fresard (2021) across all US analysts by fiscal year.
Project Horizon	Average horizon of investment projects which we proxy by the average horizon of the business plan that firms use in the industry. Data on firm business plan horizon are collected from SEC filings and averaged by 2-digit SIC industry. Project Horizon is time-invariant by SIC2-industry.
Q	$(at - ceq + chso * prcc_f)/at$ (from last available financial statements in Compustat).
Assets	at (from last available financial statements in Compustat).
Size	Log of Assets.
Cash flow	$(ib + dp)/at$ (from last available financial statements in Compustat).
Other Variables Used For Cross-Sectional Analysis	
CEO Wealth Performance Sensitivity	Scaled Wealth-Performance Sensitivity from Edmans, Gabaix, and Landier (2009). This is the dollar change in CEO wealth for a 100 percentage point change in firm value, divided by annual flow compensation. We ignore observations with value over 200.
CEO Equity Ownership	Percentage of equity shares owned by the CE0 (Item *shrown_excl_opts_pct* from last available record in Execucomp).
Short Horizon Institutional Investors	Percentage of institutional investors with short horizon from Derrien, Kecskes, and Thesmar (2013). The horizon of investors is measured based on their portfolio turnover.
New SEO likelihood	Predicted SEO probability over the next 12 months estimated from a probit model with a dummy equal to one if equity capital is raised as a dependent variable and the lags of Leverage, Cash Flow, Q, Sales Growth, 2-digit SIC Industry Growth, Size, Age, Cash, and an indicator variable equal to one if a dividend was paid as model predictors. Equity capital is raised in a given fiscal year if the total dollar amount of new equity issues ($sstk$) exceeds 5% of the firm market capitalisation ($chso * prcc_f$) at the end of the previous (fiscal) year. Leverage is measured as $(dlc + dltt)/(dlc + dltt + ceq)$. Cash Flow is $(ib + dp)/at$. Q is $(at - ceq + chso * prcc_f)/at$. Sales growth is the growth of sales ($sale$). 2-digit SIC Industry Growth is the average sales growth by 2-digit SIC industry. Size is the log of assets (at). Age is the log of the number of years in Compustat since inception. Cash is the amount of cash (che) as a percentage of total assets (at).

Variable	Definition
Residual Debt Maturity	Average maturity of debt amortization defined as $(dd1 + 2 \times dd2 + 3 \times dd3 + 4 \times dd4 + 5 \times dd5)/(dd1 + dd2 + dd3 + dd4 + dd5)$ (from last available financial statements in Compustat).
Poison Pill or Class. Board	Dummy equal to one if the company adopted a poison pill and / or its board is a classified board. Primary source of information on a firm statutes is ISS. When no information is available in ISS, we use Capital IQ.
Takeover Defense Score	Takeover Defense Score from Capital IQ. Capital IQ determines the strength of a company's takeover defenses by assigning values to various aspects of its corporate governance and takeover defenses it has adopted, and averaging these weighted points. The resulting score is between 0 and 1, with a higher number indicating stronger takeover defenses. The calculation is determined by a proprietary formula by Capital IQ.
#Mentions of ST vs. LT in SEC filings	Percentage of words in SEC filings referring to "short-term" as opposed to "long-term" and defined as $\#ST$ words/($\#ST$ words + $\#LT$ words), where $\#ST$ words (resp. $\#LT$ words) is the total number of occurrences of the words "short-term", "short-run", "current" and "currently" (resp. "long-term" 'and "long-run") in all regulatory forms filed by the company over the fiscal year.
WACC (Martin (2016))	Weighted Average Cost of Capital ($WACC$), first calculated by firm, and then averaged by 2-digit SIC industry (weighted by total assets). At the firm level, $WACC_{i,t} = [Ke_{i,t} \times (chso_{i,t} * prcc\_f_{i,t}) + Kd_{i,t} \times (1 - \text{top statutory tax rate}_{i,t}) \times (dltt_{i,t} + dlc_{i,t})]/[(chso_{i,t} * prcc\_f_{i,t}) + dltt_{i,t} + dlc_{i,t}]$. $Ke_{i,t} = rf_t + \beta_{i,t} \times ERP_t$ and $Kd_{i,t} = rf_t + \text{Corporate Spread}_t$. rf_t is the yield of the 10-year US Treasury bill at t (from FRED St Louis website). Corporate Spread$_t$ is the average spread on BB corporate bonds at t (from FRED St Louis website). $\beta_{i,t}$ is the company 3-year weekly equity beta obtained by regressing weekly (excess) stock returns on (excess) market returns over the last 3 years. We drop negative betas, as well as the same number of observations on right-hand side of the distribution. ERP_t is the equity risk premium from Martin (2016) at t. All Compustat items are from the last available financial statements,
WACC (Campbell and Thompson (2008) - In)	Same as WACC (Martin (2016)) except that the source for the equity risk premium (ERP_t) is the in-sample predicted excess market return based on the predictors of Campbell and Thompson (2008).
WACC (Campbell and Thompson (2008) - Out)	Same as WACC (Martin (2016)) except that the source for the equity risk premium (ERP_t) is the out-of-sample predicted excess market return based on the predictors of Campbell and Thompson (2008).
WACC (Damodaran (2022))	Same as WACC (Martin (2016)) except that the source for the equity risk premium (ERP_t) is the implied equity risk premium from Damodaran website (https://pages.stern.nyu.edu/ adamodar/)
Reporting Lag	Average difference in number of days between the earnings announcement date (*rdq*) and the date of the reported accounting statements (*datadate*) of the company during the fiscal year (from Compustat Quaterly).
Capex Guidance	Dummy equal to one if a guidance was made about the dollar amount of capex in I/B/E/S for the corresponding fiscal year.
Expansion Plan Disclosure	Indicator variable equal to 1 if the company voluntarily discloses information over the fiscal year about its investment policy and / or its expansion plans (i.e., if one ore more News item#31 are recorded in Capital IQ Key Development). According to Capital IQ, news item#31 refers to news related to "the growth of a company, usually by means of increasing their current operations through internal growth, like entering into new markets with existing products, opening a new branch, establishing a new division, increasing production capacity, or investing additional capital in the current business. Growth by acquisition is not covered in this event type."

Appendix II – Division-level Variable Definitions

Variable	Definition
Division Capex	$capxs/dps$ aggregated by 2-digit SIC division (from last available financial statements in Compustat Segments).
Project Horizon	Project Horizon for the corresponding 2-digit SIC division. See Appendix I for more details about how Project Horizon is calculated.
Division Q	Industry Q for the corresponding 2-digit SIC division. Industry Q is the average Q (defined as $(at - ceq + chso * prcc_f)/at$ from last available financial statements in Compustat) across all firms from the same 2-digit SIC industry.
Division Assets	ias aggregated by 2-digit SIC division (from last available financial statements in Compustat Segments).
Division Size	Log of Assets.
Division Cash flow	ops/ias aggregated by 2-digit SIC division (from last available financial statements in Compustat Segments). ias is measured at the end of the previous fiscal year ($fyear$)

Appendix III – Derivations in the Model

Proof of Lemma 1.

The equilibrium stock price. We first show that the equilibrium stock price is given by eq.(9) when the informed' trading strategy is given by eq.(8). In equilibrium, the dealer's price must satisfy (see eq.(5)):

$$p_1^*(O; I_b^*, I_m^*, h) = \mathrm{E}(V(I_b^*, h)\,|O = z + x^*(s_{st}, s_{lt}))\,. \tag{24}$$

As $x^*(s_{st}, s_{lt}) = \beta_{st}(s_{st} - \kappa I_b) + \beta_{lt}(s_{st} - I_b)$, we deduce that O is normally distributed with mean $E(O) = 0$ from the view point of the dealer (since the dealer expects the signal s_{st} to be normally distributed with mean κI_b and the signal s_{lt} to be normally distributed with mean I_b). Therefore

$$p_1^*(O; I_b^*, I_m^*, h) = \mathrm{E}(V(I_b^*, h)) + \lambda O, \tag{25}$$

with $\lambda = \frac{Cov(V(I_b^*,h),O)}{Var(O)}$. From eq.(3), we deduce that $\mathrm{E}(V(I_b^*, h)) = \Delta(h, r, \kappa)I_b$. Moreover, using this equation and the fact that $E(O) = 0$, we obtain

$$Cov(V(I_b^*, h), O) = E(V(I_b^*, h)O) = \frac{(1-h)}{1+r}E(\theta_{st}(I_b^*)O) + \frac{h}{(1+r)^2}E(\theta_{lt}(I_b^*)O). \tag{26}$$

Thus, as $\theta_{st}(I_b^*) = \kappa I_b^* + \eta_{st}$ and $\theta_{lt}(I_b^*) = I_b^* + \eta_{st}$, we have (observe that I_b^* is a constant):

$$Cov(V(I_b^*, h), O) = \frac{(1-h)}{1+r}\beta_{st}\sigma^2_{\eta st} + \frac{h}{(1+r)^2}\beta_{lt}\sigma^2_{\eta lt}. \tag{27}$$

Moreover

$$Var(O) = Var(x^*(s_{st}, s_{lt}) + z) = \sigma_z^2 + \beta_{st}^2 Var(s_{st}) + \beta_{lt}^2 Var(s_{lt}), \tag{28}$$

where the second equality comes from (i) the fact that $x^*(s_{st}, s_{lt}) = \beta_{st}(s_{st}-\kappa I_b)+\beta_{lt}(s_{st}-I_b)$, (ii) the independence of z and the informed investors' signals, and (iii) the independence of the informed investors' short-term and long-term signals. Using the expressions for β_j and observing that $Var(s_j) = \frac{\sigma^2_{\eta_j}}{R_j^2}$ for $j \in \{st, lt\}$, we obtain:

$$Var(O) = \sigma_z^2 + (\frac{(1-h)}{1+r})^2\frac{R_{st}^2}{4\lambda^2}\sigma^2_{\eta^2_{st}} + (\frac{h}{(1+r)^2})^2\frac{R_{lt}^2}{4\lambda^2}\sigma^2_{\eta^2_{lt}} \tag{29}$$

Thus, we deduce that:

$$\lambda = \frac{Cov(V(I_b^*, h), O)}{Var(O)} = \frac{\frac{(1-h)}{1+r}\beta_{st}\sigma^2_{\eta st} + \frac{h}{(1+r)^2}\beta_{lt}\sigma^2_{\eta lt}}{\sigma_z^2 + (\frac{(1-h)}{1+r})^2\frac{R_{st}^2}{4\lambda^2}\sigma^2_{\eta^2_{st}} + (\frac{h}{(1+r)^2})^2\frac{R_{lt}^2}{4\lambda^2}\sigma^2_{\eta^2_{lt}}} \tag{30}$$

Substituting β_{st} and by β_{lt} by their expressions in the numerator and solving the previous equation for λ, we obtain the expression for λ in Lemma 1.

The informed investor's optimal trading strategy. We now show that if the stock price is given by eq.(9) then it is optimal for the informed investor to use the trading strategy given by eq.(8). The informed investor's optimal order solves:

$$x^* \in Argmax_x E(x(V(I_b, h) - p(x+z)) \mid s_{st}, s_{lt}). \tag{31}$$

Using the expression for the equilibrium price given in eq.(9) and writing the FOC of this optimization problem, we deduce that:

$$x^*(s_{st}, s_{lt}) = \frac{E(V(I_b^*, h) \mid s_{st}, s_{lt}) - E(V(I_b^*, h))}{2\lambda}, \tag{32}$$

where $E(V(I_b^*, h)) = \Delta(h, r, \kappa)I_b^*$. Moreover, using eq.(3), we obtain:

$$E(V(I_b^*, h) \mid s_{st}, s_{lt}) = \frac{1-h}{1+r}E(\theta_{st} \mid s_{st}) + \frac{h}{(1+r)^2}E(\theta_{lt} \mid s_{lt}). \tag{33}$$

As all variables are normally distributed, standard calculations yield:

$$E(\theta_j \mid s_j) = E(\theta_j) + R_j^2(s_j - E(\theta_j)), \quad for \quad j \in \{st, lt\}. \tag{34}$$

We deduce from eq.(33) that

$$E(V(I_b^*, h) \mid s_{st}, s_{lt}) = E(V(I_b^*, h)) + \frac{(1-h)R_{st}^2}{(1+r)}(s_{st} - E(\theta_{st})) + \frac{hR_{lt}^2}{(1+r)^2}(s_{lt} - E(\theta_{lt})). \tag{35}$$

Hence, substituting this expression for $E(V(I_b^*, h) \mid s_{st}, s_{lt})$ in eq.(32) and observing that $E(\theta_{st}) = \kappa I_b$ and $E(\theta_{lt}) = I_b$, we deduce that:

$$x^*(s_{st}, s_{lt}) = \beta_{st}(s_{st} - \kappa I_b) + \beta_{lt}(s_{st} - I_b), \tag{36}$$

where β_j is as given in the lemma.

Proof of Proposition 1. Eq.(13) which characterizes the optimal investment level for the firm follows directly from substituting eq.(11) into the manager's optimal investment problem given by eq.(7) and taking the FOC of this problem. The claims regarding the effect of R_j^2 and h on optimal investment follows directly from the expressions for $\gamma(R_{st}^2, R_{lt}^2, h)$ in eq.(12) and the fact that $C'(.)$ is strictly increasing in I_m^* since $C(.)$ is strictly convex.

Proof of Corollary 1. The efficient level of investment is obtained from eq.(14) when

$\omega = 0$ (the manager maximizes the long-term value of the firm). Thus

$$I^e = \frac{\kappa}{1+r} + \frac{h}{(1+r)^2}, \tag{37}$$

that is the firm efficiently invests up to the point where the marginal cost of \$1 of investment (I^e) equal the marginal benefit (present value) of \$1 of investment. We deduce from eq.(14) that:

$$U = I^e - I^*_m = (\frac{\omega}{(1+r)})(1-(1-h)R^2_{st}) + (\frac{\omega h}{(1+r)^2})(1-R^2_{lt}). \tag{38}$$

Thus, $U > 0$ (the firm underinvests) when $\omega > 0$ since $R^2_j \leq 1$ and $0 < h < 1$. Moreover the level of underinvestment decreases with the informativeness of the short-term and the long-term signals. Last it is direct that $\frac{\partial U}{\partial h \partial R^2_{st}} = \frac{\omega\kappa}{(1+r)} = -2\alpha_3 > 0$ while $\frac{\partial U}{\partial h \partial R^2_{lt}} = -\frac{\omega}{(1+r)^2} = -2\alpha_4 < 0$.

Proof of Proposition 2. Following steps that are very similar to those followed to derive Lemma 1, one can show that the expected equilibrium stock price when the firm has two projects is:

$$\mathrm{E}(p^*_1(O, I_{bst}, I_{blt}, I_{st}, I_{lt})) = \Delta(I_{bst}, I_{blt}) + \frac{\kappa}{2(1+r)}R^2_{st}(I_{st}-I_{bst}) + \frac{1}{2(1+r)^2}R^2_{lt}(I_{lt}-I_{blt}), \tag{39}$$

with $\Delta(I_{bst}, I_{blt}) = \frac{\kappa I_{bst}}{1+r} + \frac{I_{blt}}{(1+r)^2}$ (I_{bh} is the market maker and the informed investor's conjecture about the firm's investment in the short-term and the long-term projects, respectively).

At date 0, the manager chooses I_{st} and I_{lt} so that:

$$\{I^*_{st}, I^*_{lt}\} \in Argmax_{\{I_{st}, I_{lt}\}} \quad \omega\mathrm{E}(p^*_1(O; I_{b,st}, I_{b,st}, I_{st}, I_{lt})) + (1-\omega)\mathrm{E}(V(I_{st}, I_{lt})) + M - C(I_{st}, I_{lt}), \tag{40}$$

under the constraint that $\bar{I} = I_{st} + I_{lt}$ and where $\mathrm{E}(V(I_{st}, I_{lt})) = \frac{\kappa I_{st}}{1+r} + \frac{I_{lt}}{(1+r)^2}$. The first order condition of this problem yields:

$$I^*_{st} = I^e(\bar{I}) + \frac{\omega}{2}(\frac{\kappa}{1+r}(\frac{R^2_{st}}{2} - 1) - \frac{1}{(1+r)^2}(1 - \frac{R^2_{lt}}{2}), \tag{41}$$

where $I^e(\bar{I}) = \frac{\bar{I}}{2} + \frac{\kappa}{1+r} - \frac{1}{(1+r)^2}$. Thus, $I^e(\bar{I})$ is the efficient level of investment in the short-term project (the one obtains when $\omega = 0$ so that the manager only cares about the long-run value of the firm). The rest of the proposition is immediate.